Project Manual for

Franklin Street & Industrial Drive

Pump Station Renovations

City of Van Wert

2020

Jerry Mazur - Mayor

Members of City Council

Jon Tomlinson	Jeff Agler
Joi Mergy	Ken Markward
Steve Trittschuh	Bill Marshall
Joel Penton, Sr.	Warren Straley

STATE OF OHIO
KATHRYN A. WAMBO
E-76329
REGISTERED PROFESSIONAL ENGINEER

Kathryn A. Wambo
2/6/2020

Jones & Henry
ENGINEERS, LTD.

STATE OF OHIO
THEODORE A. BENNETT
E-70768
REGISTERED PROFESSIONAL ENGINEER

Theodore A. Bennett
2/6/2020

3103 Executive Parkway, Suite 300
Toledo, Ohio 43606
419.473.9611

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DIVISION 16 – ELECTRICAL

IF ANY OF THE PAGES LISTED ABOVE ARE NOT INCLUDED IN THESE CONTRACT DOCUMENTS, PLEASE ADVISE.

END OF SECTION

CITY OF VAN WERT

FRANKLIN STREET & INDUSTRIAL DRIVE PUMP STATION RENOVATIONS

ADVERTISEMENT FOR BIDS

Sealed Bids for Franklin Street & Industrial Drive Pump Station Renovations, will be received by the City Van Wert, at 515 East Main Street, Van Wert, Ohio 45891, in Council Chambers, 11:00 A.M., local time, on Thursday, March 26, 2020, at which time they will be publicly opened and read.

In general, the work consists of the renovation of the City's existing Franklin Street Pump Station and existing Industrial Drive Pump Station. The renovated Franklin Street Pump Station will be a duplex submersible pump station constructed inside an existing wet well, and the renovated Industrial Drive Pump Station will be an above grade suction lift pump station constructed on an existing wet well.

The issuing office is Jones & Henry Engineers, Ltd., 3103 Executive Parkway, Suite 300, Toledo, Ohio 43606. Copies of the Bidding Documents may be examined at the Owner's office listed above or the issuing office, without charge.

Technical questions regarding the project should be e-mailed to the Project Manager Theodore A. Bennett, P.E. at tbennett@jheng.com at Jones & Henry Engineers, Ltd.

Copies of Bidding Documents and Contract Documents may be obtained electronically from Newfax Corporation, Phone 419-241-5157, www.newfaxcorp.com. A non-refundable fee will be required for each set of Bidding and Contract Documents by Newfax Corporation payable to Newfax Corporation.

Neither Owner nor Engineer has any responsibility for the accuracy, completeness or sufficiency of any bid documents obtained from any source other than the source indicated in these documents. Obtaining these documents from any other source(s) may result in obtaining incomplete and inaccurate information. Obtaining these documents from any source other than directly from the source listed herein may also result in failure to receive any addenda, corrections, or other revisions to these documents that may be issued.

Bids must be submitted on the forms bound herein, must contain the names of every person or company interested therein, and shall be accompanied by either a Bid Guaranty and Contract Bond in the amount of 100% of the amount bid with satisfactory corporate surety, or by a certified check on a solvent bank in the amount of not less than 10% of the amount of the Bid, subject to conditions provided in the Instructions to Bidders. The successful bidder will be required to furnish satisfactory Performance Bond and Maintenance and Guarantee Bond in the amount of 100% of the Bid.

The Contractor shall be required to pay not less than the prevailing wage rates established by the State Wage Determinations issued by the U.S. Department of Labor.

Any Bid may be withdrawn prior to the scheduled closing time for receipt of Bids, but no bidder shall withdraw his Bid within 90 days after the actual opening thereof.

The bid notice is also available at ww.vanwert.org under Notices/Hot Topics

Jay Fleming

Safety-Service Director

Title

To Newspaper:

Advertise: March 11, 2020

Furnish Affidavit

INSTRUCTIONS TO BIDDERS

ARTICLE 1 – DEFINED TERMS

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

A. Bidder - One who submits a Bid directly to Owner as distinct from a sub-bidder, who submits a bid to a Bidder.

B. Issuing Office - The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.

C. Successful Bidder - The Bidder to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of the Bidding Documents may be obtained from the Issuing Office in the number and format stated in the advertisement or invitation to bid.

2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within 5 days of Owner's request, Bidder shall submit (a) written evidence establishing its qualifications such as financial data, previous experience, and present commitments, and (b) the following additional information:

A. Evidence of Bidder's authority to do business in the state where the Project is located.

B. Subcontractor and Supplier qualification information; coordinate with provisions of Article 12 of these Instructions, "Subcontractors, Suppliers, and Others."

C. List of equipment suppliers to be used.

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

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

3.04 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

ARTICLE 4 – SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

4.01 *Site and Other Areas*

A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

B. Easements and their conditions are listed in these documents.

4.02 *Existing Site Conditions*

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

1. The Supplementary Conditions identify:

a. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site.

b. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

c. reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.

d. Technical Data contained in such reports and drawings.

2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

B. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or adjacent to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

C. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 5.03, 5.04, and 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous

Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 5.06 of the General Conditions.

4.03 *Site Visit and Testing by Bidders*

A. Bidder shall conduct the required Site visit during normal working hours, and shall not disturb any ongoing operations at the Site.

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

C. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site.

D. Bidder shall comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.

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

4.04 *Owner's Safety Program*

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

4.05 *Other Work at the Site*

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

ARTICLE 5 – BIDDER'S REPRESENTATIONS

5.01 It is the responsibility of each Bidder before submitting a Bid to:

A. examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;

B. visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;

C. become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work;

D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings;

E. consider the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs;

F. agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;

G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;

H. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;

I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and

J. agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 6 – RESERVED

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all parties recorded as having received the Bidding Documents. Questions after the date established in the Instructions to Bidders may

not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

7.02 Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents.

ARTICLE 8 – BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 100 percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a certified check, bank money order, or a Bid bond (on the form included in the Bidding Documents) issued by a surety meeting the requirements of Paragraphs 6.01 and 6.02 of the General Conditions.

8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults.

8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within seven days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

9.01 The number of days within which, or the dates by which, the Work is to be substantially completed, and completed and ready for final payment, are set forth in the Agreement.

ARTICLE 10 – LIQUIDATED DAMAGES

10.01 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 11 – SUBSTITUTE AND "OR-EQUAL" ITEMS

11.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or "or-equal" items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or-equal" item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.

11.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

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

12.02 Subsequent to the submittal of the Bid, Owner may not require the Successful Bidder or Contractor to retain any Subcontractor, Supplier, or other individual or entity against which Contractor has reasonable objection.

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

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

12.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, or other individuals or entities. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.06 of the General Conditions.

ARTICLE 13 – PREPARATION OF BID

13.01 The Bid Form is included with the Bidding Documents.

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

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

13.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown. The corporate seal shall be affixed and attested by the corporate secretary or an assistant corporate secretary.

13.03 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The partnership's address for receiving notices shall be shown.

13.04 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the firm's address for receiving notices shall be shown.

13.05 A Bid by an individual shall show the Bidder's name and address for receiving notices.

13.06 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture's address for receiving notices shall be shown.

13.07 All names shall be printed in ink below the signatures.

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

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

13.10 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

ARTICLE 14 – BASIS OF BID

14.01 RESERVED

14.02 *Unit Price*

A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.

B. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity" (which Owner or its representative has set forth in the Bid Form) for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.

C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

14.03 *Allowances*

A. For cash allowances the Bid price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with Paragraph 13.02.B of the General Conditions.

ARTICLE 15 – SUBMITTAL OF BID

15.01 The Bidding Documents have been provided electronically, a Bidder is responsible for furnishing separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 7 of the Bid Form.

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

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

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

16.01 A Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.

16.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01 and submit a new Bid prior to the date and time for the opening of Bids.

16.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 17 – OPENING OF BIDS

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

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

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

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

19.03 Evaluation of Bids

A. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

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

19.04 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.

19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 20 – BONDS AND INSURANCE

20.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the Agreement (executed by Successful Bidder) to Owner, it shall be accompanied by required bonds and insurance documentation.

ARTICLE 21 – SIGNING OF AGREEMENT

21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement (and any bonds and insurance

documentation required to be delivered by the Contract Documents) to Owner. Within ten days thereafter, Owner shall deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 22 – SALES AND USE TAXES

22.01 Owner is exempt from Ohio state sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes shall not be included in the Bid. Refer to Paragraph SC-7.09 of the Supplementary Conditions for additional information.

ARTICLE 23 – RESERVED

ARTICLE 24 – RETAINAGE

24.01 Provisions concerning retainage are set forth in the Agreement.

ARTICLE 25 – WAGE RATES

25.01 The Bidder to whom the Contract is awarded will be required to pay as a minimum, the prevailing wage rates, current throughout the work, promulgated by the State. Wage rates received for this project are included in the Exhibits of the Supplementary Conditions.

ARTICLE 26 – QUESTIONS REGARDING BID DOCUMENTS

26.01 All questions shall be submitted by e-mail to Theodore A. Bennett, P.E. at Jones & Henry Engineers, Ltd. at 3103 Executive Parkway, Suite 300, Toledo, OH 43606, tbennett@jheng.com, no later than 11:00 AM on Friday, March 20, 2020 in order to receive a response.

ARTICLE 27 – ENGINEER'S ESTIMATE

27.01 The Engineer's Opinion of Probable Construction cost for the work is $571,700.00.

BID FORM

CITY OF VAN WERT, OH

FRANKLIN STREET & INDUSTRIAL DRIVE PUMP STATION RENOVATIONS

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

City of Van Wert

515 E. Main Street

Van Wert, OH 45891

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

Addendum No.	Addendum, Date
_____	_____
_____	_____
_____	_____
_____	_____

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.

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

J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;

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

C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the e execution of the Contract.

ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for unit prices indicated on the following page(s):

UNIT PRICE BID

Bidder acknowledges that (1) each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and (2) estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

Item No.	Description	Estimated Amount	Unit	Unit Price in Numbers		Unit Price in Words	Total Estimated Cost of Item	
1	Mobilization & Demobilization	1	LS					
2a	Bypass Pumping – Franklin Street Site	4	WK					
2b	Bypass Pumping – Industrial Drive Site	3	WK					
3	Storm Water Pollution Prevention	1	LS					
4a	Franklin Street Pump Station Renovation Including Accessories and Appurtenances	1	LS					
4b	Industrial Drive Pump Station Renovation Including Accessories and Appurtenances	1	LS					
5a	Preconstruction Sewer Cleaning and Televising 12-inch Sewers	600	LF					
5b	Post-Construction Sewer Cleaning and Televising 12-inch Sewers	600	LF					
5c	Post-Construction Sewer Cleaning and Televising 6-inch Sewers	400	LF					

Item No.	Description	Estimated Amount	Unit	Unit Price in Numbers		Unit Price in Words	Total Estimated Cost of Item	
6a	Franklin Street Wet Well Protective Coating	1	LS					
6b	Industrial Drive Wet Well Protective Coating	1	LS					
Allow A	Telemetry Interface and Programming	1	LS	$5,000	00	Five Thousand Dollars	$6,000	00
Allow B	Chemical Grout Injection of Pipe Connections	1	LS	$2,000	00	Two Thousand Dollars	$2,000	00
Total Estimated Construction Cost:								

ARTICLE 6 – TIME OF COMPLETION

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

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

ARTICLE 7 – ATTACHMENTS TO THIS BID

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

A. Required Bid security;

B. Evidence of authority to do business in the state of the Project;

C. Required Bidder Qualification Statement with supporting data.

ARTICLE 8 – DEFINED TERMS

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

ARTICLE 9 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

_____

By:
[Signature] _____

[Printed name] _____
(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:
[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

_____

_____

_____

_____

Telephone Number: _____

Email Address: _____

Contact Name: _____

_____

Bidder's License No.: _____
(where applicable)

PERSONAL PROPERTY TAX AFFIDAVIT

STATE OF OHIO)
)ss.
COUNTY OF _____)

_____, being first duly sworn, deposes and says as follows: answering whichever is applicable by placing an "X" before items 1 or 2.

1. ( ) We are not charged with any delinquent personal property taxes on the general tax list of personal property in _____ County, Ohio.

2. ( ) We are charged with delinquent personal property taxes on the general tax list of _____County, Ohio including unpaid penalties and interest in the amount of $_____.

_____
Bidder

By: _____

Title: _____

Sworn and subscribed before me this _____ day of _____ 20 _____.

_____
Notary Public in and for

_____ State

My Commission Expires:

_____ 20_____

BID GUARANTY AND CONTRACT BOND
(SECTION 153.571 OHIO REVISED CODE)

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned _____ _____as principal and _____ _____ as sureties, are hereby held and firmly bound unto _____as OWNER in the penal sum of the dollar amount of the bid submitted by the principal to the OWNER on _____ _____ to undertake the project known as _____ _____.

The penal sum referred to herein shall be the dollar amount of the principal's bid to the OWNER incorporating any additive or deductive alternate proposals made by the principal on the date referred to above to the OWNER, which are accepted by the OWNER. In no case shall the penal sum exceed the amount of _____ _____dollars.

(If the foregoing blank is not filled in, the penal sum will be the full amount of the principal's bid, including alternates. Alternatively, if the blank is filled in, the amount stated must not be less than the full amount of the bid including alternates, in dollars and cents. A percentage is not acceptable.) For the payment of the penal sum well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that whereas the above-named principal has submitted a bid on the above referred to project;

Now, therefore, if the OWNER accepts the bid of the principal and the principal fails to enter into a proper contract in accordance with the bid, plans, details, specifications, and bills of material; and in the event the principal pays to the OWNER the difference not to exceed ten percent of the penalty hereof between the amount specified in the bid and such larger amount for which the OWNER may in good faith contract with the next lowest bidder to perform the work covered by the bid; or in the event the OWNER does not award the contract to the next lowest bidder and resubmits the project for bidding, the principal pays to the OWNER the difference not to exceed ten percent of the penalty hereof between the amount specified in the bid, or the costs, in connection with the resubmission, of printing, new contract documents, required advertising, and printing and mailing notices to prospective bidders, whichever is less, then this obligation shall be null and void, otherwise to remain in full force and effect; if the OWNER accepts the bid of the principal and the principal within fifteen days after the awarding of the contract enters into a proper contract in accordance with the bid, plans, details, specifications, and bills of material, which said Contract is made a part of this bond the same as though set forth herein.

Now also, if the said principal shall well and faithfully do and perform the things agreed to be done and performed according to the terms of said contract; and shall pay all lawful claims of

subcontractors, materialmen, and laborers, for labor performed and material furnished in the carrying forward, performing, or completing of said contract; we agreeing and assenting that this undertaking shall be for the benefit of any materialman or laborer having a just claim, as well as for the OWNER herein; then this obligation shall be void; otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

The said surety hereby stipulates and agrees that no modifications, omissions, or additions, in or to the terms of the said contract or in or to the plans or specifications therefore shall in any way affect the obligations of said surety on its bond and does hereby waive notice of any such modifications, omissions, or additions to the terms of the contract or in or to the plans and specifications.

SIGNED AND SEALED this _____ day of _____, 20_____.

Principal:

_____

By: _____

Title: _____

Surety: Surety Company Address:

_____ _____
Street

By _____ _____
Attorney-in-Fact City State Zip

Surety Agent's Address:

_____
Agency Name

_____
Street

_____
City State Zip

NOTICE OF AWARD

Date of Issuance:

Owner:	City of Van Wert, OH	Owner's Contract No.:	
Engineer:	Jones & Henry Engineers, Ltd.	Engineer's Project No.:	261-7596.001 & .003
Project:	Franklin Street & Industrial Drive Pump Station	Contract Name:	Franklin Street & Industrial Drive Pump Station

Bidder:

Bidder's Address:

TO BIDDER:

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

_____ .

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

The Contract Price of the awarded Contract is: $_____*[note if subject to unit prices, or cost-plus]*

5 unexecuted counterparts of the Agreement will be sent by the Engineer under separate cover.

☐ a set of the Drawings will be delivered separately from the Contract Booklets.

You must comply with the following conditions precedent within 15 days of the date of this Notice of Award:

1. Deliver to Owner 5 counterparts of the Agreement, fully executed by Bidder.
2. Deliver with the executed Agreement(s) the Contract security *[e.g., performance and payment bonds]* and insurance documentation as specified in the Instructions to Bidders and General Conditions, Articles 2 and 6.

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner: City of Van Wert, Ohio

Authorized Signature

By:

Title:

Copy: Jones & Henry Engineers, Ltd.

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

THIS AGREEMENT is by and between City of Van Wert, Ohio ("Owner") and _____ ("Contractor").

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: the renovation of the City's existing Franklin Street Pump Station and existing Industrial Drive Pump Station. The renovated Franklin Street Pump Station will be a duplex submersible pump station constructed inside an existing wet well, and the renovated Industrial Drive Pump Station will be an above grade suction lift pump station constructed on an existing wet well.

ARTICLE 2 – THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: City of Van Wert Franklin Street & Industrial Drive Pump Station Renovations.

ARTICLE 3 – ENGINEER

3.01 The part of the Project that pertains to the Work has been designed by Jones & Henry Engineers, Ltd..

3.02 The Owner has retained Jones & Henry Engineers, Ltd. ("Engineer") to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

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

4.02 *Contract Times: Days*

A. The Work will be substantially completed within 210 days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 240 days after the date when the Contract Times commence to run.

4.03 *Liquidated Damages*

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: Contractor shall pay Owner $500 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.

2. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner $500 for each day that expires after such time until the Work is completed and ready for final payment.

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

4.04 *Special Damages*

A. In addition to the amount provided for liquidated damages, Contractor shall reimburse Owner (1) for any fines or penalties imposed on Owner as a direct result of the Contractor's failure to attain Substantial Completion according to the Contract Times, and (2) for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Substantial Completion (as duly adjusted pursuant to the Contract), until the Work is substantially complete.

B. After Contractor achieves Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times, Contractor shall reimburse Owner for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Work to be completed and ready for final payment (as duly adjusted pursuant to the Contract), until the Work is completed and ready for final payment.

ARTICLE 5 – CONTRACT PRICE

A. Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents.

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

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

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

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

a. 92 percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and

b. 92 percent of cost of materials and equipment not incorporated in the Work.

B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 98 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less amounts of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.

ARTICLE 7 – INTEREST

7.01 All amounts not paid when due shall not bear interest.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

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

A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.

B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.

F. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

G. 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.

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

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

J. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

A. The Contract Documents consist of the following:

1. This Agreement (pages 1 to ___, inclusive).
2. Bid Guarantee & Contract bond (pages ___ to ___, inclusive).
3. Performance bond (pages ___ to ___, inclusive).
4. Labor and Maintenance bond (pages ___ to ___, inclusive).
5. Maintenance and Guarantee bond (pages ___ to ___, inclusive).
6. General Conditions (pages ___ to ___, inclusive).
7. Supplementary Conditions (pages ___ to ___, inclusive).
8. Specifications as listed in the table of contents of the Project Manual.
9. Drawings (not attached but incorporated by reference) consisting of ___ sheets with each sheet bearing the following general title: ___ **[or]** the Drawings listed on the attached sheet index.
10. Addenda (numbers ___ to ___, inclusive).
11. Exhibits to this Agreement (enumerated as follows):
    a. Contractor's Bid (pages ___ to ___, inclusive).
12. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
    a. Notice to Proceed.
    b. Work Change Directives.
    c. Change Orders.
    d. Field Orders.

B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 9.

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

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

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

10.02 *Assignment of Contract*

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

assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 *Successors and Assigns*

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

10.04 *Severability*

A. 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.

10.05 *Contractor's Certifications*

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

10.06 *Other Provisions*

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

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

This Agreement will be effective on _____ (which is the Effective Date of the Contract).

OWNER:	CONTRACTOR:
_____	_____
By: _____	By: _____
Title: _____	Title: _____
	(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)
Attest: _____	Attest: _____
Title: _____	Title: _____
Address for giving notices:	Address for giving notices:
_____	_____
_____	_____
_____	_____
	License No.: _____ *(where applicable)*

CERTIFICATION OF FISCAL OFFICER

The undersigned, as _____ of _____ hereby certifies that funds sufficient to meet the requirement of this Contract have been lawfully appropriated for such purpose and are in the treasury, or in the process of collection.

By: _____

Title: _____

APPROVAL BY OWNER'S LEGAL OFFICER

By: _____

Title:

Date: _____

NOTICE TO PROCEED

Owner:	City of Van Wert, Ohio	Owner's Contract No.:	
Contractor:		Contractor's Project No.:	
Engineer:	Jones & Henry Engineers, Ltd.	Engineer's Project No.:	261-7596.001 & .003
Project:	Franklin Street & Industrial Drive Pump Station Renovations	Contract Name:	Franklin Street & Industrial Drive Pump Station Renovations
		Effective Date of Contract:	

TO CONTRACTOR:

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on [_____, 20__]. *[see Paragraph 4.01 of the General Conditions]*

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work shall be done at the Site prior to such date. In accordance with the Agreement, [the date of Substantial Completion is _____, and the date of readiness for final payment is_____] ***or*** [the number of days to achieve Substantial Completion is _____, and the number of days to achieve readiness for final payment is _____].

Before starting any Work at the Site, Contractor must comply with the following:
[Note any access limitations, security procedures, or other restrictions]

Owner**:** City of Van Wert, Ohio

Authorized Signature

By:

Title:

Date Issued:

Copy: Engineer

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that _____ _____ Contractor, as Principal and_____ _____, as Surety, are held and firmly bound unto _____, hereinafter called the Owner, in the penal sum of _____ dollars ($),good and lawful money of the United States of America to be paid to said Owner, its legal representatives and assigns, for which payment well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, and each and every one of them jointly and severally, firmly by these presents.

WHEREAS, the above-named Principal has entered into a certain written Agreement with the Owner, dated the _____ day of _____ A.D. 20 , for construction of work entitled (hereinafter called the Contract) which Contract and Specifications for said work shall be deemed a part hereof as fully as if set out herein.

NOW THEREFORE, THE CONDITIONS OF THIS OBLIGATION IS SUCH, that if the said Principal shall well and faithfully do and perform the things agreed by him to be done and performed according to the terms of said Contract and shall pay all lawful claims of subcontractors, material suppliers, and laborers, for labor performed and materials furnished in carrying forward, performing or completing of the said Contract, we agreeing and assenting that this undertaking shall be for the benefit of any material supplier or laborer having a just claim as well as for the obligee herein, then this obligation shall be void, otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

The said surety, for value received, hereby stipulates and agrees that no charge, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any wise affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the work of the Specifications.

WITNESS our hands and seals this _____ day of _____ A.D. 20 .

Witnesses:

Principal:

_____ _____
Printed Printed

_____ _____ (Seal)
Signature Principal Signature

_____ _____
Printed

_____ _____ (Seal)
Signature Surety Signature

I hereby approve the form and correctness of the foregoing Bond.

_____
Owner's Legal Officer

Date: _____

MAINTENANCE AND GUARANTEE BOND

KNOW ALL MEN BY THESE PRESENTS, that _____ _____ Contractor, as Principal and_____ _____, as Surety, are held and firmly bound unto _____, hereinafter called the Owner, in the penal sum of _____ dollars ($),good and lawful money of the United States of America to be paid to said Owner, its legal representatives and assigns, for which payment well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, and each and every one of them jointly and severally, firmly by these presents.

WHEREAS, the above-named Principal has entered into a certain written Agreement with the Owner, dated the _____ day of _____ A.D. 20 , for construction of work entitled (hereinafter called the Contract) which Contract and Specifications for said work shall be deemed a part hereof as fully as if set out herein.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION ARE SUCH, that by and under said Contract, the above-named Principal has agreed with the Owner that for a period specified in paragraph 15.08. of the General Conditions, to keep in good order and repair any defect in all the work done under said Contract either by the Principal or his Subcontractors, or his material suppliers, that may develop during said period due to improper materials, defective equipment, workmanship or arrangements, and any other work affected in making good such imperfections, shall also be made good all without expense to the Owner, excepting only such part or parts of said work as may have been disturbed without the consent or approval of the Principal after the final acceptance of the work, and that whenever directed

so to do by the Owner by notice served in writing, either personally or by mail on the Principal at

_____

_____

OR _____

legal representatives, or successors, or on the Surety at _____

_____

WILL PROCEED at once to make such repairs as directed by said Owner; and in case of failure so to do within one week from the date of service of such notice, or within reasonable time not less than one week, as shall be fixed in said notice, then the Owner shall have the right to purchase such materials and employ such labor and equipment as may be necessary for the purpose, and to undertake, do and make such repairs, and charge the expense thereof, to and receive same from said Principal or Surety. If any repair is necessary to be made at once to protect life and property, then and in that case, the Owner may take immediate steps to repair or barricade such defects without notice to the Contractor. In such accounting, The Owner shall not be held to obtain the lowest figures for the doing of the work, or any part thereof, but all sums actually paid therefore shall be charged to the Principal or Surety. In this connection, the judgment of the Owner is final and conclusive. If the said Principal for a period specified in paragraph 15.08. of the General Conditions and, shall keep said work so constructed under said Contract in good order and repair, excepting only such part or parts of said work which may have been disturbed without the consent or approval of said Principal after the final acceptance of the same, and shall whenever notice is given as hereinbefore specified, at once proceed to make repair as in said notice directed, or shall reimburse said Owner for any expense incurred by making such repairs, should the Principal or Surety fail to do as hereinbefore specified, and shall fully indemnify, defend, and save harmless the Owner from all suits and actions for damages of every name and description brought or claimed against it for or on account of any injury or damage to person or property received or sustained by any party or parties, by or from any of the acts or omissions or through the negligence of said Principal, servants, agents, or employees, in the prosecution of the work included in said Contract, then the above obligation shall be void, otherwise to remain in full force and effect.

IN WITNESS WHEREOF, the parties hereto have caused this instrument to be executed by their respective authorized officers this _____ day of _____ A.D. 20 .

Signed, Sealed, and Delivered

In the Presence of:

Witnesses:

_____	_____
Printed	
_____	_____ (Seal)
Signature	Principal
_____	_____
Printed	
_____	_____ (Seal)
Signature	Surety

I hereby approve the form and correctness of the foregoing Bond.

_____
Owner's Legal Officer

Date: _____

CONTRACTOR'S AFFIDAVIT
CURRENT ESTIMATE

STATE OF _____)
) ss
County of _____)

The undersigned, _____, hereby represents that on _____ it was awarded a contract by the City of Lima, Ohio, hereinafter called Owner, to construct Franklin Street & Industrial Drive Pump Station Renovations, in accordance with terms and conditions of Contract No. _____; and the undersigned further represents that all progress payments heretofore received by the Contractor from the Owner on account of the Work have been applied by the Contractor to discharge in full all of the Contractor's obligations incurred in connection with the Work covered by all prior progress payments in accordance with the applicable subcontracts, except as follows:_____
_____.

This affidavit is freely and voluntarily given with full knowledge of the facts, on this _____ day of ,
A.D. 20__.

_____Contractor

_____By
Title

Subscribed and sworn to before me this ____ day of _____, A.D. 20_____

_____
Notary Public

(Seal) My Commission Expires _____

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	City of Van Wert, Ohio	Owner's Contract No.:	
Contractor:		Contractor's Project No.:	
Engineer:	Jones & Henry Engineers, Ltd.	Engineer's Project No.:	261-7520.001 & .003
Project:	Franklin Street & Industrial Drive Pump Station Renovations	Contract Name:	

This [preliminary] [final] Certificate of Substantial Completion applies to:

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

_____

Date of Substantial Completion

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

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

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows: *[Note: Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.]*

Amendments to Owner's responsibilities: ☐ None
☐ As follows

Amendments to Contractor's responsibilities: ☐ None
☐ As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract.

EXECUTED BY ENGINEER:	RECEIVED:	RECEIVED:
By: _____	By: _____	By: _____
(Authorized signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

CONTRACTOR'S AFFIDAVIT
WAIVER OF LIENS/FINAL ESTIMATE

STATE OF _____)
) ss
County of _____)

The undersigned, _____

hereby represents that on _____ it was awarded a contract by the City of Van Wert hereinafter called the OWNER, to construct the Franklin Street & Industrial Drive Pump Station Renovations in accordance with terms and conditions of Contract No. _____; and the undersigned further represents that the subject work has now been accomplished and the said Contract has now been completed.

The undersigned hereby warrants and certifies that all of its indebtedness arising by reason of the said Contract has been fully paid or satisfactorily secured; and that all claims from Subcontractors and others for labor and material used in accomplishing the said project, as well as all other claims arising from the performance of the said Contract, have been fully paid or satisfactorily settled. The undersigned further agrees that, if any such claim should hereafter arise, he (it) shall assume responsibility for the same immediately upon request to do so by the OWNER.

The undersigned, for a valuable consideration, the receipt of which is hereby acknowledged, does further hereby waive, release and relinquish any and all claims or right of lien which the undersigned now has or may hereafter acquire upon the subject premises for labor and material used in accomplishing said project owned by the OWNER.

This affidavit is freely and voluntarily given with full knowledge of the facts, on this day of_____, A.D. 20___.

By _____
CONTRACTOR

Title _____

Subscribed and sworn to before me this _____ day of _____, A.D. 20__.

_____
Notary Public

(Seal) My Commission Expires _____

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.

3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Bid*—The offer of a Bidder submitted on the prescribed form setti7ng forth the prices for the Work to be performed.

5. *Bidder*—An individual or entity that submits a Bid to Owner.

6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.

7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.

8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.

9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.

10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; 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; or (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. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. ("CERCLA"); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5101 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. ("RCRA"); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.

13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.

14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .

15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.

16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.

17. *Cost of the Work*—See Paragraph 13.01 for definition.

18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.

19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.

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

21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.

22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.

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

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

25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.

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

27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.

28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

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

30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.

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

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

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

35. *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.

36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

37. *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 furnished by Owner which are designated for the use of Contractor.

38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.

39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.

40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.

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

43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.

44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.

45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

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

47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 *Terminology*

A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives*:

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

C. *Day*:

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*:

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

a. does not conform to the Contract Documents; or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).

E. *Furnish, Install, Perform, Provide*:

1. 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.

2. 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.

3. 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.

4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words "furnish," "install," "perform," or "provide," then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Contractor's Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.

C. *Evidence of Owner's Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.06 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the 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.

B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items 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 items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

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

3.02 *Reference Standards*

A. Standards Specifications, Codes, Laws and Regulations

1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be

effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*:

1. *Contractor's Verification of Figures and Field Measurements*: Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents*: If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*:

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:

   a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or

   b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer 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 thereunder.

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 give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

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

4.02 *Starting the Work*

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

4.03 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.

B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. 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.

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. 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 but are not limited to the following:

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

2. abnormal weather conditions;

3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and

4. acts of war or terrorism.

D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.

E. Paragraph 8.03 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.

F. Contractor shall not be entitled to an 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.

G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

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

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

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

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for

Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

B. *Removal of Debris During Performance of the Work*: During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning*: Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

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

5.03 *Subsurface and Physical Conditions*

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

1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and

3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with

respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

A. *Notice by Contractor*: If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
2. is of such a nature as to require a change in the Drawings or Specifications; or
3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

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

B. *Engineer's Review*: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine 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 5.04.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.

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 5.04.A;

   b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

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

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 5.04.A.

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

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, 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.

5.05 *Underground Facilities*

A. *Contractor's Responsibilities*: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

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 Underground Facilities at the Site;
   b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
   c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
   d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated 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 7.15), 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 promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

D. *Owner's Statement to Contractor Regarding Underground Facility*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

E. *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 Underground Facility 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 Underground Facility 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 13.03;

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 5.05.B.

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, 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.

~~5.06 *Hazardous Environmental Conditions at Site*~~

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

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

~~2. Technical Data contained in such reports and drawings.~~

~~B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:~~

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

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

~~3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.~~

C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.

E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.

H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2)

was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.

B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

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

D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving

rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.

E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.

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

6.02 *Insurance—General Provisions*

A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.

B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.

H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.

I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.

J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

A. *Workers' Compensation*: Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.

2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).

3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).

B. *Commercial General Liability—Claims Covered*: Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:

1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.

2. claims for damages insured by reasonably available personal injury liability coverage.

3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

C. *Commercial General Liability—Form and Content*: Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage:

a. Such insurance shall be maintained for three years after final payment.

b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.

2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
3. Broad form property damage coverage.
4. Severability of interest.
5. Underground, explosion, and collapse coverage.
6. Personal injury coverage.
7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.

D. *Automobile liability*: Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.

E. *Umbrella or excess liability*: Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.

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

G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.

H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and 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.

~~I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:~~

1. include at least the specific coverages provided in this Article.
2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
3. ~~contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.~~
4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.
5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.

J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

~~A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.~~

B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

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

1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the

remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."

2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.

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

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

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).

6. extend to cover damage or loss to insured property while in transit.

7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.

8. allow for the waiver of the insurer's subrogation rights, as set forth below.

9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.

10. not include a co-insurance clause.

11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.

12. include performance/hot testing and start-up.

13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.

B. *Notice of Cancellation or Change*: All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.

C. *Deductibles*: The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.

~~D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.~~

E. *Additional Insurance*: If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.

F. *Insurance of Other Property*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, 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 insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. 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 or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.

D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

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

7.02 *Labor; Working Hours*

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

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications 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 source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 *"Or Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.

1. If Engineer in its sole discretion determines that 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, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:

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

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

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;

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

4) it is not objectionable to Owner.

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

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

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.

C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.

E. *Treatment as a Substitution Request*: If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer considered the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 *Substitutes*

A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.

1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.

2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

a. shall certify that the proposed substitute item will:

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

2) be similar in substance to that specified, and

3) be suited to the same use as that specified.

b. will state:

1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,

2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and

3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.

c. will identify:

1) all variations of the proposed substitute item from that specified, and

2) available engineering, sales, maintenance, repair, and replacement services.

d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.

B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.

C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.

F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.

B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.

C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.

D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.

E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.

F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.

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

J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.

K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.

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

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

N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

O. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor

2. shall create 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.

7.07 *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 the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.08 *Permits*

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

7.09 *Taxes*

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

7.10 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws 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.

7.11 *Record Documents*

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

7.12 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

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

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

D. 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.

E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. Contractor's duties and responsibilities for safety and protection 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 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

A. Contractor shall designate 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.

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent 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 or are required as a result thereof. 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.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements*:

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

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

b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

B. *Submittal Procedures for Shop Drawings and Samples*: Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings*:

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

   b. 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 services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

2. *Samples*:

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

   b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.

3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Other Submittals*: Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.

D. *Engineer's Review*:

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.

3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.

5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.

6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. *Resubmittal Procedures*:

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

2. Contractor shall furnish required 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 a 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.

3. 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.

7.17 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.

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

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. 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 by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
4. use or occupancy of the Work or any part thereof by Owner;
5. any review and approval of a Shop Drawing or Sample submittal;
6. the issuance of a notice of acceptability by Engineer;
7. any inspection, test, or approval by others; or
8. any correction of defective Work by Owner.

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

7.18 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that 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 but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.

B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A 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 or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *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 and 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, or equipment 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 properly licensed professional, 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, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this paragraph, Engineer's review and 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 and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.

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

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.

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

work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:

1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
2. an itemization of the specific matters to be covered by such authority and responsibility; and
3. the extent of such authority and responsibilities.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

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

adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.

C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.

D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

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

9.03 *Furnish Data*

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

9.04 *Pay When Due*

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

9.05 *Lands and Easements; Reports, Tests, and Drawings*

A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.

B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.

C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

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

B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

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

10.05 *Shop Drawings, Change Orders and Payments*

A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.

B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.

C. Engineer's authority as to Change Orders is set forth in Article 11.

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

10.06 *Determinations for Unit Price Work*

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

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

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

10.08 *Limitations on Engineer's Authority and Responsibilities*

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

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

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

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

E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

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

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

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

1. *Change Orders*:

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

b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.

2. *Work Change Directives*: A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. 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 completion of the Work set out in the Work Change Directive. 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*: Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. 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.

11.02 *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. 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 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.

11.03 *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 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *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 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.

B. An adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); 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 11.04.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 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.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 Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 13.01.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 11.04.C.2.a and 11.04.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 13.01.A.1 and 13.01.A.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 five 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 13.01.B.4, 13.01.B.5, and 13.01.C;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five 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 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *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 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.

B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *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 seek 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.

1. *Procedures*: Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. 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 Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

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 Article 12.

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 Article 12.

11.07 *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 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and

4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *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 12 – CLAIMS

12.01 *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;
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 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim 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 17 for final resolution of disputes.

F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any

time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim 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 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:

1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. 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 13.01.C, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees 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. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts 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 13.01.

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. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

   b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, 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.

   ~~c. 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.~~

   d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

   e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

   f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), 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 Contractor's fee.

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

h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded*: The term Cost of the Work 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, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

2. 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 13.01.B.

D. *Contractor's Fee*: When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. 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 11.04.C.

E. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances*: Contractor agrees that:

1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment 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.

13.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

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

~~E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an 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 estimated quantity of such item indicated in the Agreement;~~

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

~~3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.~~

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

14.01 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction will have access to the

Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

14.02 *Tests, Inspections, and Approvals*

A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

~~B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.~~

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

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

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

E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. *Notice of Defects*: Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

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

14.05 *Uncovering Work*

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

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

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

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

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-

offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

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

15.01 *Progress Payments*

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. *Applications for Payments*:

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. 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 a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

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

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*:

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design

professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

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

a. to supervise, direct, or control the Work, or

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

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

d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or

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

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

a. the Work is defective, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

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

e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*:

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

E. *Reductions in Payment by Owner*:

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

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

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

e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

f. the Work is defective, requiring correction or replacement;

g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

h. the Contract Price has been reduced by Change Orders;

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

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

k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

l. there are other items entitling Owner to a set off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

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

15.03 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which 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 seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.

2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and

will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment*:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents;

   b. consent of the surety, if any, to final payment;

   c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

   d. a list of all disputes that Contractor believes are unsettled; and

   e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Application and Acceptance*:

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice

to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

D. *Payment Becomes Due*: Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.

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

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the 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, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such other adjacent areas;
2. correct such defective Work;
3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not

limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

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

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

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

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

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

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

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

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; 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, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

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

18.03 *Cumulative Remedies*

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

18.04 *Limitation of Damages*

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

18.05 *No Waiver*

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

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Headings*

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

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® C-700 (2013 Edition). All provisions that are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

ARTICLE 2 – PRELIMINARY MATTERS

SC-2.02 Copies of Documents

SC-2.02 Add the following new paragraphs following Paragraph 2.02.C

D. The Engineer can provide electronic drawing files to assist the Contractor with layout and construction staking of the improvements. The Engineer will require the Contractor sign an electronic release prior to providing the files to the Contractor. The wording of the release shall be as follows:

"These electronic files are provided to you for your convenience. Because electronic files can deteriorate or be damaged or be modified inadvertently or information from the electronic documents may be presented to you on your system differently than the original because of your software or system setup, these files may not be accurate. Any conclusion or information obtained or derived from such electronic files will be at your sole risk.

Information contained in the electronic documents is for information and reference in connection with this project only. The information is not intended or represented to be suitable for reuse on extensions of the original project or on any other project.

You should perform an acceptance test of the electronic documents immediately and inform us of any problems with the electronic documents. Jones & Henry will not be responsible for providing additional copies of these electronic files to you after 60 days from the date the documents are provided to you."

E. Files will be provided in the Engineer's CAD software format. The Contractor's surveyor will be responsible for making any required conversions necessary to permit the surveyor to use the files for layout or staking.

F. The Contractor's surveyor should check horizontal and vertical control points to confirm there has been no shift in the electronic drawing file during the staking operation.

SC2.06 Electronic Submittals

SC-2.06 Add the following new paragraphs immediately after Paragraph 2.06 C.

D. Electronic files are provided to you for your convenience. Because electronic files can deteriorate or be damaged or be modified inadvertently or information from the electronic documents may be presented to you on your system differently than the original because of your software or system setup, these files may not be accurate. Any conclusion or information obtained or derived from such electronic files will be at your sole risk.

E. Information contained in the electronic documents is for information and reference in connection with this project only. The information is not intended or represented to be suitable for reuse on extensions of the original project or on any other project.

F. You should perform an acceptance test of the electronic documents immediately and inform us of any problems with the electronic documents. Jones & Henry will not be responsible for providing additional copies of these electronic files to you after 60 days from the date the documents are provided to you.

ARTICLE 3 – DOCUMENTS; INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

SC-3.01.C Delete Paragraph 3.01.C in its entirety and insert the following new paragraph in its place:

C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version, as printed by Engineer, shall govern.

ARTICLE 4 COMMENCEMENT AND PROGRESS OF THE WORK

SC4.01 *Commencement of Contract Times; Notice to Proceed*

SC 4.01 Delete Paragraph 4.01.A and substitute the following in its place:

A. The Contract Times will commence to run on the date listed on the Notice to Proceed

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-5.03 Subsurface and Physical Conditions

SC 5.03 Add Paragraph 5.03.A.4 immediately after Paragraph 5.03.A.3.

4. Unless specifically identified in these Supplemental Conditions, no reports of explorations or tests of subsurface conditions at or adjacent to the Site, or drawings of physical conditions relating to existing surface or subsurface structures at the Site, are known to Owner.

SC-5.03 Subsurface and Physical Conditions

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

C. The following reports of explorations and tests of subsurface conditions at or adjacent to the Site are known to Owner:

1. None

D. The following drawings of physical conditions relating to existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities) are known to Owner:

1. None

E. Contractor may request copies of reports and drawings identified in SC 5.03.C and SC 5.03.D that were not included with the Bidding Documents from Engineer.

SC-5.06 Hazardous Environmental Conditions

SC 5.06 Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following new paragraphs in their place:

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

B. Not Used.

ARTICLE 6 – BONDS AND INSURANCE

SC-6.01 Performance, Payment, and Other Bonds

SC 6.01 Add the following new paragraph immediately after Paragraph 6.01.F:

G. The Contractor shall furnish a Performance Bond and a Maintenance and Guarantee Bond, each in the amount of at least 100% of the Contract Price as security for the faithful performance and payment of all Contractor's obligations.

SC-6.03 Contractor's Insurance

SC 6.03 Delete Paragraph 6.03.I of the General Conditions and substitute the following in its place:

I. General provisions: The policies of insurance required by these Paragraphs 6.03, 6.04 and 6.05 shall:

SC 6.03 Delete Paragraph 6.03.I.3 of the General Conditions and substitute the following in its place:

3. Contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 30 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.

SC 6.03 Add the following new paragraph immediately after Paragraph 6.03.J

K. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation, and related coverages under Paragraphs 6.03.A.1 and A.2 of the General Conditions:

State:	**Statutory**
Federal, if applicable (e.g., Longshoreman's):	Statutory
Jones Act coverage, if applicable:	
Bodily injury by accident, each accident	$ 1,000,000
Bodily injury by disease, aggregate	$ 1,000,000
Employer's Liability:	
Bodily injury, each accident	$ 1,000,000
Bodily injury by disease, each employee	$ 1,000,000
Bodily injury/disease aggregate	$ 1,000,000
For work performed in monopolistic states, stop-gap liability coverage shall be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:	Statutory
Foreign voluntary worker compensation	Statutory

2. Contractor's Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions:

General Aggregate	$ 5,000,000
Products - Completed Operations Aggregate	$ 5,000,000
Personal and Advertising Injury	$ 4,000,000
Each Occurrence (Bodily Injury and Property Damage)	$ 4,000,000

3. Automobile Liability under Paragraph 6.03.D. of the General Conditions:

Bodily Injury:	
Each person	$ 2,000,000

Each accident $ 2,000,000

Property Damage:

Each accident $ 2,000,000

[or]

Combined Single Limit of $ 4,000,000

4. Excess or Umbrella Liability:

Per Occurrence $ 5,000,000

General Aggregate $ 5,000,000

5. Contractor's Pollution Liability:

Each Occurrence $ 1,500,000

General Aggregate $ 1,500,000

☐ If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract

6. Additional Insureds: In addition to Owner and Engineer, include as additional insureds the following: NONE

SC-6.04 Owner's Liability Insurance

SC-6.04 Delete Paragraph 6.04.A and B of the General Conditions and substitute the following in its place:

A. The Contractor shall purchase and maintain during the entire term of this Contract one separate policy providing Owner's and Contractor's Protective Liability coverages. The named insured on this policy shall be:

1. The Owner; and
2. The Engineer - Jones & Henry Engineers, Ltd.; and
3. Others if specifically required by special provision in the Contract Documents.

B. The policy shall be provided on a form commonly referred to in the insurance industry as an "occurrence" type of policy form. (Claims made policy forms are not acceptable.)

C. This insurance policy shall be a separate policy in addition to the coverage required in 6.03. No other insurance policy may substitute for or contribute to the coverage or limits afforded by this insurance policy, except a separate excess Owner's and Contractor's Protective Policy.

D. This policy shall cover the total project and include explosion, collapse, and underground coverages for the entire Work provided by the Contractor and Subcontractors.

E. The policy shall stipulate that the "designated Contractor" includes the Contractor and all Sub-contractors engaged in the Work.

F. The original policy shall be submitted to and filed with the Owner or its designated representative.

SC-6.05 Property Insurance

SC-6.05. Add the following new paragraphs immediately before 6.05.A. and continue on the numbering sequentially.

A. Contractor shall provide either property insurance in the form of Builder's Risk or installation floater as appropriate for the work as required herein.

B. Contractor shall provide and maintain installation floater insurance for property under the care, custody, or control of Contractor. The installation floater insurance shall be a broad form or "all risk" policy providing coverage for all materials, supplies, machinery, fixtures, and equipment that will be incorporated into the Work. Coverage under the Contractor's installation floater will include:

1. any loss to property while in transit,
2. any loss at the Site, and
3. any loss while in storage, both on-site and off-site.

Coverage cannot be contingent on an external cause or risk, or limited to property for which the Contractor is legally liable. The Contractor will be solely responsible for any deductible carried under this coverage and claims on materials, supplies, machinery, fixture, and equipment that will be incorporated into the Work while in transit or in storage. This policy will include a waiver of subrogation applicable to Owner, Contractor, Engineer, all Subcontractors, and the officers, directors, partners, employees, agents and other consultants and subcontractors of any of them.

SC-6.05.A.1 Add the following new subparagraph after subparagraph 6.05.A.1:

a. In addition to Owner, Contractor, and all Subcontractors, include as insureds the following:
1) Engineer

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

SC-7.09 Taxes

SC 7.09 Add a new paragraph immediately after Paragraph 7.09.A:

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

1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.
2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

SC-7.12 Safety and Protection

SC-7.12 Insert the following after the second sentence of Paragraph 7.12.C:

The following Owner safety programs are applicable to the Work: N/A.

ARTICLE 9 – OWNER'S RESPONSIBLITIES

SC-9.11 Evidence of Financial Arrangements

SC-9.11 Add the following new paragraph immediately after Paragraph 9.11.A:

B. The Owner has funded this project with the assistance of Funding Agencies listed in the Exhibits to the Supplementary Conditions and are made a part of the Contract Documents. Contractor shall comply with the requirements of the funding agencies, when there is a conflict between the funding agency requirements and any part of the Contract Documents the funding agency requirements shall take precedence, without voiding any requirement of the Contract Documents.

SC-9.13 Owner's Site Representative

SC-9.13 Add the following new paragraph immediately after Paragraph 9.12 of the General Conditions:

SC-9.13 The Owner may furnish an Owner's Site Representative to represent the Owner at the site to observe progress and quality of the work. The Owner's Site Representative is not the Engineer's Consultant, agent or employee, but will possess the same authority over the work as defined for the RPR in Section SC10.03.B.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

SC-10.03 Project Representative

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

B. The Resident Project Representative (RPR), if provided, will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.

1. General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.

2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.

3. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.

4. Liaison:

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

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

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

5. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.

6. Shop Drawings and Samples:

    a. Record date of receipt of Samples and Contractor-approved Shop Drawings.

    b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.

    c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.

7. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.

8. Review of Work and Rejection of Defective Work:

    a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.

    b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or

does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

9. Inspections, Tests, and System Start-ups:

   a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.

   b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

10. Records:

   a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.

   b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.

   c. Maintain records for use in preparing Project documentation.

11. Reports:

   a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.

   b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.

   c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.

12. Payment Requests: Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

13. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

14. Completion:

    a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.

    b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.

    c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).

2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.

3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.

4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work.

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

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

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

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

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

SC-13.01 Cost of the Work

SC 13.01.B.5.c Delete Paragraph 13.01.B.5.c in its entirety and insert the following in its place:

c. Construction Equipment and Machinery:

1) Rentals of all construction equipment and machinery, and the parts thereof, 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.

2) Costs for equipment and machinery owned by Contractor will be paid at a rate shown for such equipment in the Rate Book appropriate for the Project. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs. Costs will include the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, shall cease to accrue when the use thereof is no longer necessary for the changed Work. Equipment or machinery with a value of less than $1,000 will be considered small tools.

SC-13.03 Unit Price Work

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

E. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:

1. if the extended price of a particular item of Unit Price Work amounts to 5 percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and

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

3. if Contractor believes that Contractor has incurred additional expense as a result thereof, Contractor may submit a Change Proposal, or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, Owner may make a Claim, seeking an adjustment in the Contract Price.

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

SC-14.02 Tests, Inspections and Approvals

SC 14.02.B Delete Paragraph 14.02.B in its entirety and insert the following in its place:

B. Contactor shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Contractor, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.

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

SC-15.01 Progress Payments

SC 15.01.A Add the following new subparagraph to Paragraph 15.01.A:

1. Mobilization for Contractor and any tier of subcontractor(s) shall be considered collectively and shall not exceed 10 percent of the Contract Price. Mobilization shall be those costs associated with the initiation of the project and site work, including but not limited to, transporting of personnel, equipment, materials, supplies, incidental items; establishment of the field offices, temporary facilities necessary for the project, bonds and insurances, submittal requirements, permits, field supervision, final cleanup and demobilization. Mobilization does not include such items as, contract negotiations and bid preparation.

   a. Where the work is covered by unit price and no item has been included for mobilization as defined in Section 01010., then this work is considered incidental to the work and will not be paid separately.

   b. Where the work is covered by unit prices, and item(s) for mobilization, as described in Section 01010 have been included, the maximum allowable amount shall be ten percent of the aggregate of all items excluding mobilization. Where mobilization is included as multiple items, then the aggregate amount of all mobilization items shall not exceed the allowable 10 percent.

2. Costs for submittal requirements, field office and supervision, where identified separately in the schedule of values shall be considered for payment monthly. When the cost is a lump sum as submitted in accordance with 2.6, the monthly cost shall be established by dividing the lump sum by the number of monthly estimates based on the original contract time. No adjustments shall be made for any contract time extensions.

3. Mobilization shall be included in the progress payments, in accordance with the schedule of values and unit prices. When the work, excluding mobilization and inventory, has progressed to an amount equal to five percent or more of the contract price, then an amount of not more than 50 percent of the mobilization cost will be considered for inclusion in the progress payment. Prior to the established five percent, Owner may consider payment on invoices for bonds and insurances and permits; this amount shall be subtracted for the total amount from mobilization.

   Up to an additional 40 percent of the mobilization cost will be considered for inclusion in the progress payments once the work, excluding mobilization and inventory, has progressed to an amount equal to 50 percent of the Contract Price. The remaining mobilization payment will be paid as part of the final payment.

15.03 Substantial Completion

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

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

END OF SECTION

PAYROLL SUBMITTALS AND WAGE DETERMINATION

1. PAYROLL SUBMITTALS

Amended House Bill No. 1170 amended Section 4115.99 and enacted Section 4115.071 of the Revised Code to improve detection of violations of Ohio's Prevailing Wage Law. This Law is effective September 26, 1974.

Amended House Bill No. 1171 amended Sections 4115.04 and 411.05 of the Revised Code to require adjustments in the prevailing wage due to new collective bargaining agreements. This law is effective September 26, 1974.

Amended House Bill No. 1171 provided for an escalator in the prevailing wage rate. Each time a new prevailing wage rate is established by the Department of Industrial Relations, then the rate is required to be paid on all ongoing public improvement projects. Contractors shall include these escalators in his bid proposal. There will be no addition to a contractor's contract due to a new prevailing wage rate being provided. Refer to Revised Section 4115.05.

The following wage information shall be furnished to the Department of Administrative Services, Division of Public Works, Office of State Architect and Engineer.

a) Every contractor or subcontractor who is subject to Laws pertaining to the wages and hours on Public Works projects shall, at the beginning of performance under the contract, submit the dates during the life of his contract when payments of wages to employees are to be made.

b) Each contractor or subcontractor, within three weeks after each pay date, shall furnish a certified copy of his complete payroll for each date, exhibiting for each employee paid any wages, the employee's name, current address, social security number, number of hours worked each day during the pay period, the total for each week, his hourly rate of pay, his job classification, fringe payments, and deduction from his wages.

c) The prime contractor shall be responsible for the submission of copies of payrolls of all subcontractors.

d) The payroll submitted shall be executed by the prime contractor or subcontractor or a duly appointed agent thereof and shall recite that the payroll is correct and that the wage rates shown are not less than those required by the contract.

2. SECTION 4115.99 (A) Whoever violates Section 4115.08 or 4115.09 of the Revised Code shall be fined not less than twenty-five dollars or more than five hundred dollars. (B) Whoever violates Section 4115.071, 4115.10, or 4115.11 of the Revised Code shall be fined five hundred dollars for the first offense; for each subsequent offense such person shall be fined one thousand dollars.

3. WAGE DETERMINATION (Obtain wage rates prior to advertising)

The attached pages are Prevailing Rates of Wages as ascertained by the Department of Industrial Relations for this project as provided in Section 4115.03 through 4115.14 of the Ohio Revised Code

EXHIBIT 1

WAGE RATES

Prevailing Wage Rate
Skilled Crafts

Name of Union: Asbestos Local 41 Heat & Frost Insulators

Change # : LCN01-2016fbLoc41

Craft : Asbestos Worker **Effective Date :** 07/27/2016 **Last Posted :** 07/27/2016

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Asbestos Insulation Worker	$29.82		$5.84	$4.00	$0.15	$0.00	$3.63	$1.49	$0.00	$0.00	$44.93	$59.84
Apprentice	**Percent**											
1st year 3 months	49.73	$14.83	$5.59	$0.00	$0.15	$0.00	$3.41	$0.69	$0.00	$0.00	$24.67	$32.08
1st year 9 months	60.05	$17.91	$5.59	$0.00	$0.15	$0.00	$3.79	$0.69	$0.00	$0.00	$28.13	$37.08
2nd year	70.35	$20.98	$5.59	$0.00	$0.15	$0.00	$4.21	$0.69	$0.00	$0.00	$31.62	$42.11
3rd year	78.83	$23.51	$5.59	$4.00	$0.15	$0.00	$2.75	$2.13	$0.00	$0.00	$38.13	$49.88
4th year	89.53	$26.70	$5.59	$4.00	$0.15	$0.00	$3.05	$2.13	$0.00	$0.00	$41.62	$54.97

Special Calculation Note : "Other" Benefits are for Retiree Medical and Pension Rehab.

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, DEFIANCE, MERCER, PAULDING, VAN WERT, WILLIAMS

Special Jurisdictional Note :

Details :

The removal of all insulation materials, whether they contain asbestos or not, from mechanical systems (pipes, boilers, ducts, flues, breaching, etc.) is recognized as being the exclusive work of the Asbestos Workers.

On all mechanical systems (pipes, boilers, ducts, flues, breaching, etc.) that are going to be demolished, the removal of all insulating materials whether they contain asbestos or not shall be the exclusive work of the Laborers.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Asbestos Local 207 OH IIKT

Change # : LCN01-2018fbLoc207IIKT

Craft : Asbestos Worker **Effective Date :** 08/23/2018 **Last Posted :** 08/23/2018

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Asbestos Abatement	$23.60	$7.25	$7.05	$0.65	$0.00	$0.00	$0.10	$0.00	$0.00	$38.65	$50.45
Trainee	$14.75	$7.25	$0.00	$0.65	$0.00	$0.00	$0.10	$0.00	$0.00	$22.75	$30.12

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

2 Journeymen to 1 Trainee

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, DEFIANCE, MERCER, PAULDING, VAN WERT, WILLIAMS

Special Jurisdictional Note :

Details :

Asbestos & lead paint abatement including,but not limited to the removal or encapsulation of asbestos & lead paint,all work in conjunction with the preparation of the removal of same & all work in conjunction with the clean up after said removal.The removal of all insulation materials, whether they contain asbestos or not, from mechanical systems (pipes, boilers, ducts, flues, breaching, etc.) is recognized as being the exclusive work of the Asbestos Abatement Workers.

On all mechanical systems (pipes, boilers, ducts, flues, breaching, etc.) that are going to be demolished, the removal of all insulating materials whether they contain asbestos or not shall be the exclusive work of the Laborers.
An Abatement Journeyman is anyone who has more than 300 hours in the Asbestos Abatement field.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Boilermaker Local 85

Change # : LCN01-2012kpLoc85

Craft : Boilermaker **Effective Date :** 03/28/2012 **Last Posted :** 03/28/2012

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Boilermaker	$31.01		$6.97	$10.77	$0.35	$0.00	$3.00	$2.09	$0.00	$0.00	$54.19	$69.69
Apprentice	**Percent**											
1st 6 months	70.00	$21.71	$6.97	$0.25	$0.35	$0.00	$0.25	$2.09	$0.00	$0.00	$31.62	$42.47
2nd 6 months	72.50	$22.48	$6.97	$0.25	$0.35	$0.00	$0.25	$2.09	$0.00	$0.00	$32.39	$43.63
3rd 6 months	75.00	$23.26	$6.97	$0.25	$0.35	$0.00	$0.25	$2.09	$0.00	$0.00	$33.17	$44.80
4th 6 months	77.50	$24.03	$6.97	$10.77	$0.35	$0.00	$3.00	$2.09	$0.00	$0.00	$47.21	$59.23
5th 6 months	80.00	$24.81	$6.97	$10.77	$0.35	$0.00	$3.00	$2.09	$0.00	$0.00	$47.99	$60.39
6th 6 months	85.00	$26.36	$6.97	$10.77	$0.35	$0.00	$3.00	$2.09	$0.00	$0.00	$49.54	$62.72
7th 6 months	90.00	$27.91	$6.97	$10.77	$0.35	$0.00	$3.00	$2.09	$0.00	$0.00	$51.09	$65.04
8th 6 months	95.00	$29.46	$6.97	$10.77	$0.35	$0.00	$3.00	$2.09	$0.00	$0.00	$52.64	$67.37

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

5 Journeymen to 1 Apprentice
10 Journeymen to 2 Apprentice
15 Journeymen to 3 Apprentice

Helpers will be referred in the event that apprentices are NOT available.

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, ASHLAND, AUGLAIZE, CRAWFORD, DARKE, DEFIANCE, DELAWARE, ERIE, FULTON, HANCOCK, HARDIN, HENRY, HURON, KNOX, LOGAN, LUCAS, MARION, MERCER, MORROW, OTTAWA, PAULDING, PUTNAM, RICHLAND, SANDUSKY, SENECA, SHELBY, UNION, VAN WERT, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Bricklayer Local 3 Zone 3 Tile Setters

Change # : LCN01-2019bLoc35

Craft : Bricklayer **Effective Date :** 07/01/2019 **Last Posted :** 06/26/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Bricklayer Tile Setter/Terrazzo Worker	$27.94		$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$43.17	$57.14
Tile Finisher Assistant												
1st Year	$13.94		$7.75	$1.60	$0.57	$0.00	$0.00	$0.00	$0.00	$0.00	$23.86	$30.83
2nd Year	$18.43		$7.75	$1.60	$0.57	$0.00	$0.00	$0.00	$0.00	$0.00	$28.35	$37.57
3rd Year	$22.92		$7.75	$1.60	$0.57	$0.00	$0.00	$0.00	$0.00	$0.00	$32.84	$44.30
Apprentice	**Percent**											
1st 6 months	50.00	$13.97	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$29.20	$36.19
2nd 6 months	55.00	$15.37	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$30.60	$38.28
3rd 6 months	60.00	$16.76	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$31.99	$40.38
4th 6 months	70.00	$19.56	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$34.79	$44.57
5th 6 months	75.00	$20.96	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$36.19	$46.66
6th 6 months	80.00	$22.35	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$37.58	$48.76
7th 6 months	90.00	$25.15	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$40.38	$52.95
8th 6 months	95.00	$26.54	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$41.77	$55.04

Special Calculation Note : Light Commercial Apprentices are 50% of Journeyman's rate plus full fringes

Ratio :

3 Journeymen to 1 Apprentice
8 Journeymen to 2 Apprentice
13 Journeymen to 3 Apprentice
18 Journeymen to 4 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, MERCER, VAN WERT

Special Jurisdictional Note :

Details :

BAT registered Apprentices must be employed prior to hiring Mason Finisher (s).

Prevailing Wage Rate
Skilled Crafts

Name of Union: Bricklayer Local 3 Zone 3

Change # : LCN01-2019fbLoc3

Craft : Bricklayer **Effective Date :** 07/01/2019 **Last Posted :** 06/19/2019

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Bricklayer	$27.94	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$43.17	$57.14
Stone Masons Marble Masons	$27.94	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$43.17	$57.14
Pointer Caulker Cleaner	$27.94	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$43.17	$57.14
Refractory Worker	$27.94	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$43.17	$57.14
Apprentice Indentured AFTER 02/01/2019											
1st 6 Months	$16.76	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$31.99	$40.37
2nd 6 Months	$18.16	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$33.39	$42.47
3rd 6 Months	$19.56	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$34.79	$44.57
4th 6 Months	$20.96	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$36.19	$46.67
5th 6 Months	$22.35	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$37.58	$48.76
6th 6 Months	$23.75	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$38.98	$50.86
7th 6 Months	$25.15	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$40.38	$52.96
8th 6 Months	$26.54	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$41.77	$55.04
Apprentice Indentured	**Percent**										

BEFORE 02/01/2019												
1st 6 months	50.00	$13.97	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$29.20	$36.19
2nd 6 months	55.00	$15.37	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$30.60	$38.28
3rd 6 months	60.00	$16.76	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$31.99	$40.38
4th 6 months	70.00	$19.56	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$34.79	$44.57
5th 6 months	75.00	$20.96	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$36.19	$46.66
6th 6 months	80.00	$22.35	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$37.58	$48.76
7th 6 months	90.00	$25.15	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$40.38	$52.95
8th 6 months	95.00	$26.54	$7.75	$6.46	$0.77	$0.00	$0.25	$0.00	$0.00	$0.00	$41.77	$55.04
Mason Trainees: 1-90 days	45.00	$12.57	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$12.57	$18.86
91-365 days	45.00	$12.57	$7.75	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$20.32	$26.61
2nd year	50.00	$13.97	$7.75	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$21.72	$28.71

Special Calculation Note : Light Commercial Apprentices are 50% of Journeyman's rate plus full fringes

Ratio :

1 Journeymen 1 Apprentice 1 Mason Trainee
2-6 Journeymen 2 Apprentice 1 Mason Trainee
7-12 Journeymen 3 Apprentice 2 Mason Trainee
13-18 Journeymen 4 Apprentice 2 Mason Trainee

Mason Trainee Ratio:

1 Apprentice permits 1 Mason Trainee

2 Apprentices permits 1 Mason Trainee

3 Apprentices permits 2 Mason Trainees

4 Apprentices permits 2 Mason Trainees

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, MERCER, VAN WERT

Special Jurisdictional Note :

Details :

BAT registered Apprentices must be employed prior to hiring Mason Trainee(s).

Prevailing Wage Rate
Skilled Crafts

Name of Union: Carpenter Floorlayer Zone II

Change # : LCN01-2019fbZoneII

Craft : Carpenter **Effective Date :** 06/19/2019 **Last Posted :** 06/19/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Carpenter Floorlayer	$24.98		$7.25	$9.68	$0.44	$0.00	$3.71	$0.00	$0.00	$0.00	$46.06	$58.55
Apprentice	**Percent**											
1st 3 Month Period	60.00	$14.99	$7.25	$0.00	$0.40	$0.00	$0.00	$0.00	$0.00	$0.00	$22.64	$30.13
2nd 3 Month Period	60.00	$14.99	$7.25	$0.00	$0.40	$0.00	$0.00	$0.00	$0.00	$0.00	$22.64	$30.13
2rd 6 MonthPeriod	60.00	$14.99	$7.25	$9.68	$0.40	$0.00	$3.71	$0.00	$0.00	$0.00	$36.03	$43.52
3rd 6 Month Period	65.00	$16.24	$7.25	$9.68	$0.40	$0.00	$3.71	$0.00	$0.00	$0.00	$37.28	$45.40
4th 6 Month Period	75.00	$18.73	$7.25	$9.68	$0.40	$0.00	$3.71	$0.00	$0.00	$0.00	$39.78	$49.14
5th 6 Month Period	80.00	$19.98	$7.25	$9.68	$0.40	$0.00	$3.71	$0.00	$0.00	$0.00	$41.02	$51.02
6th 6 Month Period	85.00	$21.23	$7.25	$9.68	$0.40	$0.00	$3.71	$0.00	$0.00	$0.00	$42.27	$52.89
7th 6 Month Period	90.00	$22.48	$7.25	$9.68	$0.40	$0.00	$3.71	$0.00	$0.00	$0.00	$43.52	$54.76
8th 6 Month Period	95.00	$23.73	$7.25	$9.68	$0.40	$0.00	$3.71	$0.00	$0.00	$0.00	$44.77	$56.64

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

1 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, CRAWFORD, HARDIN, HENRY, OTTAWA, PAULDING, PUTNAM, SANDUSKY, SENECA, VAN WERT, WILLIAMS, WYANDOT

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Carpenter Millwright & Pile Driver Zone II

Change # : LCN02-2019fbLocZone II

Craft : Carpenter **Effective Date :** 06/19/2019 **Last Posted :** 06/19/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Carpenter Millwright Pile Driver	$29.59		$7.25	$10.79	$0.55	$0.00	$5.25	$0.00	$0.00	$0.00	$53.43	$68.22
Apprentice	**Percent**											
1st 6 months	60.00	$17.75	$7.25	$0.00	$0.55	$0.00	$0.00	$0.00	$0.00	$0.00	$25.55	$34.43
2nd 6 months	60.00	$17.75	$7.25	$10.79	$0.55	$0.00	$5.25	$0.00	$0.00	$0.00	$41.59	$50.47
3rd 6 months	70.00	$20.71	$7.25	$10.79	$0.55	$0.00	$5.25	$0.00	$0.00	$0.00	$44.55	$54.91
4th 6 months	75.00	$22.19	$7.25	$10.79	$0.55	$0.00	$5.25	$0.00	$0.00	$0.00	$46.03	$57.13
5th 6 months	80.00	$23.67	$7.25	$10.79	$0.55	$0.00	$5.25	$0.00	$0.00	$0.00	$47.51	$59.35
6th 6 months	85.00	$25.15	$7.25	$10.79	$0.55	$0.00	$5.25	$0.00	$0.00	$0.00	$48.99	$61.57
7th 6 months	90.00	$26.63	$7.25	$10.79	$0.55	$0.00	$5.25	$0.00	$0.00	$0.00	$50.47	$63.79
8th 6 months	95.00	$28.11	$7.25	$10.79	$0.55	$0.00	$5.25	$0.00	$0.00	$0.00	$51.95	$66.01

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, HARDIN, MERCER, PUTNAM, VAN WERT, WYANDOT

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Carpenter NE District Industrial Dock & Door

Change # : LCN01-2014fbCarpNEStatewide

Craft : Carpenter **Effective Date :** 03/05/2014 **Last Posted :** 03/05/2014

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Carpenter	$19.70		$5.05	$1.00	$0.15	$0.00	$0.00	$0.00	$0.00	$0.00	$25.90	$35.75
Trainee	Percent											
1st Year	60.00	$11.82	$5.05	$1.00	$0.15	$0.00	$0.00	$0.00	$0.00	$0.00	$18.02	$23.93
2nd Year	80.20	$15.80	$5.05	$1.00	$0.15	$0.00	$0.00	$0.00	$0.00	$0.00	$22.00	$29.90

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

1 Journeymen to 1 Trainee

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note : Industrial Dock and Door is the installation of overhead doors, roll up doors and dock leveling equipment

Details :
10/27/10 New Contract jc

Prevailing Wage Rate
Skilled Crafts

Name of Union: Carpenter NW District Overhead Door

Change # : CN02-2007LocNW248

Craft : Carpenter **Effective Date :** 09/06/2007 **Last Posted :** 09/06/2007

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Carpenter Mechanic	$20.00	$0.00	$1.00	$0.20	$0.00	$0.00	$0.00			$21.20	$31.20
Intermediate Mechanic Level 2	$15.85	$0.00	$0.00	$0.20	$0.00	$0.00	$0.00			$16.05	$23.97
Mechanic Level 1	$12.00	$0.00	$0.00	$0.20	$0.00	$0.00	$0.00			$12.20	$18.20

Special Calculation Note : Fully paid reasonable & customary comprehensive medical/surgical insurance shall be provided for employee,spouse and dependent children by employer.

Ratio :

1 Journeymen Mechanic to 1 Mechanic Level 1 or Intermediate Mechanic Level 2

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, CRAWFORD, DEFIANCE, FULTON, HANCOCK, HARDIN, HENRY, LUCAS, MERCER, OTTAWA, PAULDING, PUTNAM, SANDUSKY, SENECA, VAN WERT, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

All work related to the repair, transportation, installation and servicing of doors and gates of any type: and repair, transportation and servicing of any and all items related to doors and gates: and the preparation of any openings, passageways and/or access where a door and/or gate will be installed. Including but not limited to: Upward acting doors, horizontally sliding doors, rapid roll fabric doors, overhead chain gates, sliding grills, air doors, fire doors and any other doors/or gates which are used to gain access to or prevent access to any area, enclosed or otherwise and Dock Levers. Also any devices and/or items used to operate, open or close doors.

Journeyman Mechanic - an individual that has adequately demonstrated his knowledge and proficiency at all parts of the trade, who has 3 years documented experience at that trade, or who has been certified by a bona fide apprenticeship program, registered with the US Dept of Labor/Bureau of

Apprenticeship.

Intermediate Mechanic Level 2- an employee who has performed work as a junior mechanic at least 3 years.

Mechanic Level 1- the employer may hire persons who are not journeypersons. These employees will start at 60% of the journeypersons wage rate and the employer is not required to pay fringe benefits, until the Mechanic becomes a Journeyman Mechanic.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Carpenter Zone III

Change # : LCN02-2019fbZoneIII

Craft : Carpenter **Effective Date :** 06/19/2019 **Last Posted :** 06/19/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Carpenter	$25.52		$7.25	$9.68	$0.50	$0.00	$3.71	$0.00	$0.00	$0.00	$46.66	$59.42
Apprentice	Percent											
1st 6 Months	60.00	$15.31	$7.25	$0.00	$0.50	$0.00	$0.00	$0.00	$0.00	$0.00	$23.06	$30.72
2nd 6 Months	60.00	$15.31	$7.25	$9.68	$0.50	$0.00	$3.71	$0.00	$0.00	$0.00	$36.45	$44.11
3rd 6 Months	65.00	$16.59	$7.25	$9.68	$0.50	$0.00	$3.71	$0.00	$0.00	$0.00	$37.73	$46.02
4th 6 Months	75.00	$19.14	$7.25	$9.68	$0.50	$0.00	$3.71	$0.00	$0.00	$0.00	$40.28	$49.85
5th 6 Months	80.00	$20.42	$7.25	$9.68	$0.50	$0.00	$3.71	$0.00	$0.00	$0.00	$41.56	$51.76
6th 6 Months	85.00	$21.69	$7.25	$9.68	$0.50	$0.00	$3.71	$0.00	$0.00	$0.00	$42.83	$53.68
7th 6 Months	90.00	$22.97	$7.25	$9.68	$0.50	$0.00	$3.71	$0.00	$0.00	$0.00	$44.11	$55.59
8th 6 Months	95.00	$24.24	$7.25	$9.68	$0.50	$0.00	$3.71	$0.00	$0.00	$0.00	$45.38	$57.51

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, HARDIN, MERCER, PUTNAM, VAN WERT

Special Jurisdictional Note :

Details :

Special Work Rates:
40-100 foot free fall - $ .50 per hour above scale

Over 100 foot free fall - $1.00 per hour above scale

Prevailing Wage Rate
Skilled Crafts

Name of Union: Cement Mason Bricklayer Local 97 HevHwy A

Change # : LCN01-2019fbHvyHwy

Craft : Bricklayer **Effective Date :** 06/01/2019 **Last Posted :** 05/29/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Cement Mason Bricklayer Sewer Water Works A	$29.34		$9.25	$6.41	$0.45	$0.00	$0.00	$0.00	$0.00	$0.00	$45.45	$60.12
Apprentice	**Percent**											
1st year	50.00	$14.67	$9.25	$6.41	$0.45	$0.00	$0.00	$0.00	$0.00	$0.00	$30.78	$38.12
2nd year	70.00	$20.54	$9.25	$6.41	$0.45	$0.00	$0.00	$0.00	$0.00	$0.00	$36.65	$46.92
3rd year	90.00	$26.41	$9.25	$6.41	$0.45	$0.00	$0.00	$0.00	$0.00	$0.00	$42.52	$55.72

Special Calculation Note : NOT FOR BUILDING CONSTRUCTION.

Ratio :

3 Journeymen to 1 Apprentice
6 Journeymen to 2 Apprentice
9 Journeymen to 3 Apprentice
12 Journeymen to 4 Apprentice
15 Journeymen to 5 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM,

RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE

Special Jurisdictional Note :

Details :

(A) Highway Construction, Sewer, Waterworks And Utility Construction, Industrial & Building Site Heavy Construction, Airport Construction Or Railroad Construction Work.
(B) Power Plant, Tunnels, Amusement Park, Athletic Stadium Site Work ,Pollution Control,Sewer Plant, Waste Plant, & Water Treatment Facilities, Construction.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Cement Mason Bricklayer Local 97 HevHwy B

Change # : LCN01-2019fbHvyHwy

Craft : Bricklayer **Effective Date :** 06/01/2019 **Last Posted :** 05/29/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Cement Mason Bricklayer Power Plants Tunnels Amusement Parks B	$30.33		$9.25	$6.41	$0.46	$0.00	$0.00	$0.00	$0.00	$0.00	$46.45	$61.62
Apprentice	**Percent**											
1st year	50.00	$15.16	$9.25	$6.41	$0.46	$0.00	$0.00	$0.00	$0.00	$0.00	$31.28	$38.87
2nd year	70.00	$21.23	$9.25	$6.41	$0.46	$0.00	$0.00	$0.00	$0.00	$0.00	$37.35	$47.97
3rd year	90.00	$27.30	$9.25	$6.41	$0.46	$0.00	$0.00	$0.00	$0.00	$0.00	$43.42	$57.07

Special Calculation Note : NOT FOR BUILDING CONSTRUCTION.

Ratio :

3 Journeymen to 1 Apprentice
6 Journeymen to 2 Apprentice
9 Journeymen to 2 Apprentice
12 Journeymen to 4 Apprentice
15 Journeymen to 5 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY,

PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE

Special Jurisdictional Note :

Details :

(A) Highway Construction, Sewer, Waterworks And Utility Construction, Industrial & Building Site Heavy Construction, Airport Construction Or Railroad Construction Work.
(B) Power Plant, Tunnels, Amusement Park, Athletic Stadium Site Work ,Pollution Control,Sewer Plant, Waste Plant, & Water Treatment Facilities, Construction.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Cement Mason Local 886 (Lima)

Change # : LCN01-2019fbLoc886Lima

Craft : Cement **Effective Date :** 07/03/2019 **Last Posted :** 07/03/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Cement Mason	$27.85		$8.10	$7.40	$0.30	$0.00	$4.05	$0.00	$0.00	$0.00	$47.70	$61.63
Apprentice	**Percent**											
1st 6 months	70.00	$19.50	$8.10	$7.40	$0.30	$0.00	$4.05	$0.00	$0.00	$0.00	$39.34	$49.09
2nd 6 months	80.00	$22.28	$8.10	$7.40	$0.30	$0.00	$4.05	$0.00	$0.00	$0.00	$42.13	$53.27
3rd 6 months	90.00	$25.07	$8.10	$7.40	$0.30	$0.00	$4.05	$0.00	$0.00	$0.00	$44.91	$57.45

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

5 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, HARDIN, LOGAN, MERCER, VAN WERT

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Cement Mason Statewide HevHwy Exhibit A District III

Change # : OCN01-2019fbCementHevHwy

Craft : Cement Mason **Effective Date :** 07/31/2019 **Last Posted :** 07/31/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Cement Mason	$28.71		$8.00	$6.90	$0.71	$0.00	$2.25	$0.00	$0.00	$0.00	$46.57	$60.92
Apprentice	**Percent**											
1st Year	70.00	$20.10	$8.00	$6.90	$0.71	$0.00	$2.25	$0.00	$0.00	$0.00	$37.96	$48.01
2nd Year	80.00	$22.97	$8.00	$6.90	$0.71	$0.00	$2.25	$0.00	$0.00	$0.00	$40.83	$52.31
3rd Year	90.00	$25.84	$8.00	$6.90	$0.71	$0.00	$2.25	$0.00	$0.00	$0.00	$43.70	$56.62

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

1 Journeymen to 1 Apprentice
2 to 1 thereafter

Jurisdiction (* denotes special jurisdictional note) :
ADAMS, ALLEN, ASHLAND, ATHENS, AUGLAIZE, BELMONT, CARROLL, CHAMPAIGN, CLARK, CLINTON, COSHOCTON, CRAWFORD, DARKE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GALLIA, GREENE, GUERNSEY, HARDIN, HARRISON, HOCKING, HOLMES, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, MADISON, MARION, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PIKE, PREBLE, RICHLAND, ROSS, SCIOTO, SHELBY, TUSCARAWAS, UNION, VAN WERT, VINTON, WASHINGTON, WAYNE, WYANDOT

Special Jurisdictional Note : (A) Highway Construction, Sewer, Waterworks And Utility Construction, Industrial & Building Site, Heavy
Construction, Airport Construction Or Railroad Construction Work.

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Cement Mason Statewide HevHwy Exhibit B District III

Change # : OCN01-2019fbCementHevHwy

Craft : Cement Mason **Effective Date :** 07/31/2019 **Last Posted :** 07/31/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Cement Mason	$28.87		$8.00	$6.90	$0.71	$0.00	$2.25	$0.00	$0.00	$0.00	$46.73	$61.17
Apprentice	**Percent**											
1st Year	70.00	$20.21	$8.00	$6.90	$0.71	$0.00	$2.25	$0.00	$0.00	$0.00	$38.07	$48.17
2nd Year	80.00	$23.10	$8.00	$6.90	$0.71	$0.00	$2.25	$0.00	$0.00	$0.00	$40.96	$52.50
3rd Year	90.00	$25.98	$8.00	$6.90	$0.71	$0.00	$2.25	$0.00	$0.00	$0.00	$43.84	$56.83

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

1 Journeymen to 1 Apprentice
2 to 1 thereafter

Jurisdiction (* denotes special jurisdictional note) :
ADAMS, ALLEN, ASHLAND, ATHENS, AUGLAIZE, BELMONT, CARROLL, CHAMPAIGN, CLARK, CLINTON, COSHOCTON, CRAWFORD, DARKE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GALLIA, GREENE, GUERNSEY, HARDIN, HARRISON, HOCKING, HOLMES, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, MADISON, MARION, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PIKE, PREBLE, RICHLAND, ROSS, SCIOTO, SHELBY, TUSCARAWAS, UNION, VAN WERT, VINTON, WASHINGTON, WAYNE, WYANDOT

Special Jurisdictional Note : (B) Power Plant, Tunnels, Amusement Park, Athletic Stadium Site Work ,Pollution Control,Sewer Plant,
Waste Plant, & Water Treatment Facilities, Construction.

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Electrical Local 32 Lt Commercial South West

Change # : LCN01-2020fbLoc32

Craft : Electrical **Effective Date :** 01/22/2020 **Last Posted :** 01/22/2020

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Electrician	$26.75		$6.30	$3.70	$0.80	$0.00	$2.50	$1.00	$0.00	$0.00	$41.05	$54.42
CE-3 12,001-14,000 Hrs	$22.45		$6.15	$0.67	$0.67	$0.00	$0.67	$0.37	$0.00	$0.00	$30.98	$42.21
CE-2 10,001-12,000	$17.64		$6.15	$0.53	$0.67	$0.00	$0.53	$0.37	$0.00	$0.00	$25.89	$34.71
CE-1 8,001-10,000 Hrs	$16.04		$6.15	$0.48	$0.67	$0.00	$0.48	$0.37	$0.00	$0.00	$24.19	$32.21
CW-4 6,001-8,000 Hrs	$14.43		$6.15	$0.43	$0.67	$0.00	$0.43	$0.37	$0.00	$0.00	$22.48	$29.70
CW-3 4,001-6,000 Hrs	$12.83		$6.15	$0.38	$0.67	$0.00	$0.38	$0.37	$0.00	$0.00	$20.78	$27.20
CW-2 2,001-4,000 Hrs	$12.03		$6.15	$0.36	$0.67	$0.00	$0.36	$0.37	$0.00	$0.00	$19.94	$25.96
CW-1 0-2,000 Hrs	$11.22		$6.15	$0.34	$0.67	$0.00	$0.34	$0.37	$0.00	$0.00	$19.09	$24.70
Apprentice	**Percent**											
1st period 0-1000 hrs	40.00	$10.70	$6.30	$0.32	$0.32	$0.00	$0.00	$1.00	$0.00	$0.00	$18.64	$23.99
2nd period 1000-2000 hrs	45.00	$12.04	$6.30	$0.36	$0.36	$0.00	$0.00	$1.00	$0.00	$0.00	$20.06	$26.08
3rd period 2000- 3500 hrs	55.00	$14.71	$6.30	$2.04	$0.44	$0.00	$1.38	$1.00	$0.00	$0.00	$25.87	$33.23
4th period 3500-5000 hrs	65.00	$17.39	$6.30	$2.41	$0.52	$0.00	$1.63	$1.00	$0.00	$0.00	$29.25	$37.94
	75.00	$20.06	$6.30	$2.78	$0.60	$0.00	$1.88	$1.00	$0.00	$0.00	$32.62	$42.65

5th period 5000-6500 hrs												
6th period 6500-8000 hrs	85.00	$22.74	$6.30	$3.15	$0.68	$0.00	$2.13	$1.00	$0.00	$0.00	$36.00	$47.37

Special Calculation Note : OTHER IS: Voluntary Employees Beneficiary Association.

Ratio :

Each Job Site shall be allowed 3 Journeymen to 2 Apprentices as illustrated below:
1 to 3 Journeymen to 2 Apprentices
4 to 6 Journeymen to 4 Apprentices
7 to 9 Journeymen to 6 Apprentices

The first person assigned to any job site shall be a Journeyman Wireman.

Construction Electrician and Construction Wireman Ratio
There shall be a minimum ratio of one inside Journeyman to every (4) employees of different classification per jobsite. An inside Journeyman Wireman is required on the project as the fifth (5th) worker or when apprentices are used.

Jurisdiction (* denotes special jurisdictional note) :
ALLEN, AUGLAIZE, HARDIN, LOGAN, MERCER, SHELBY, VAN WERT, WYANDOT*

Special Jurisdictional Note : In Wyandot County the following townships are included: Crawford, Jackson, Marseilles, Mifflin, Ridgeland, Ridge and Salem.

The scope of work for the light commercial agreement shall apply to the following facilities not to exceed 200,000 square feet; office buildings, shopping centers, auto sales agencies and garages, churches, funeral homes, nursing homes, hotels, retail and wholesale facilities, small stand-alone manufacturing facilities when free standing and not part of a larger facility (not to exceed 50,000 square fee), solar projects (500 panels or less) unless otherwise covered under the agreement, lighting retrofits (when not associated with remodels involving branch re-circuiting) lighting retrofits shall be defined as the changing of lamps and ballasts in existing light fixtures and shall also include the one for one replacement of existing fixtures, warehouses, gas stations, food service centers, restaurants, entertainment facilities, hospitals, clinics, motels, residential buildings.

Details :
A Certified Welder will receive $1.50 per hour above the Journeyman rate. Welders welding on galvanized shall receive $1.50 per hour above the Journeyman rate.
All work over 35 feet but less than 60 feet shall receive $.75 per hour above the Journeyman rate.
All work 60 feet or over shall receive $1.50 per hour above the Journeyman rate.
When using a JLG-typ equipment or bucket truck is used there will be no high pay unless the work is

over 60 feet.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Electrical Local 32 Voice Data Video

Change # : LCR01-2020fbLoc32VDV

Craft : Voice Data Video **Effective Date :** 01/22/2020 **Last Posted :** 01/22/2020

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Electrical Installer Technician A	$24.35	$6.50	$0.73	$0.46	$0.00	$4.40	$0.23	$0.00	$0.00	$36.67	$48.85
Electrical Installer Technician B	$23.13	$6.50	$0.69	$0.44	$0.00	$4.40	$0.23	$0.00	$0.00	$35.39	$46.95
JW Installer Technician	$21.92	$6.50	$0.66	$0.42	$0.00	$4.40	$0.23	$0.00	$0.00	$34.13	$45.09
NON-BISCI Installer	$15.83	$3.00	$0.47	$0.30	$0.00	$2.00	$0.23	$0.00	$0.00	$21.83	$29.75
Cable puller	$12.18	$3.00	$0.37	$0.23	$0.00	$0.25	$0.23	$0.00	$0.00	$16.26	$22.35
Indentured After 09-03-2018											
1st Period 0-1000 Hrs OJT	$13.39	$3.00	$0.40	$0.25	$0.00	$0.25	$0.12	$0.00	$0.00	$17.41	$24.10
2nd Period 1001-2000 Hrs OJT	$13.39	$3.00	$0.40	$0.25	$0.00	$0.25	$0.12	$0.00	$0.00	$17.41	$24.10
3rd Period 2001-3000 Hrs OJT	$15.83	$6.40	$0.47	$0.30	$0.00	$4.40	$0.23	$0.00	$0.00	$27.63	$35.55
4th Period 3001-4000 Hrs OJT	$15.83	$6.40	$0.47	$0.30	$0.00	$4.40	$0.23	$0.00	$0.00	$27.63	$35.55
5th Period 4001-5000 Hrs OJT	$18.26	$6.43	$0.55	$0.35	$0.00	$4.40	$0.23	$0.00	$0.00	$30.22	$39.35
	$18.26	$6.43	$0.55	$0.35	$0.00	$4.40	$0.23	$0.00	$0.00	$30.22	$39.35

6th Period 5001-6000 Hrs OJT												
7th Period 6001-7000 Hrs OJT	$19.48		$6.44	$0.58	$0.37	$0.00	$4.40	$0.23	$0.00	$0.00	$31.50	$41.24
8th Period 7001 Hrs	$19.48		$6.44	$0.58	$0.37	$0.00	$4.40	$0.23	$0.00	$0.00	$31.50	$41.24
Apprentice Indentured Before 09-03-2018	**Percent**											
1s 50% 0- 800 hours OJT	50.00	$12.18	$6.50	$0.37	$0.23	$0.00	$0.25	$0.12	$0.00	$0.00	$19.65	$25.73
2nd 50% 801-1600 hours OJT	50.00	$12.18	$6.50	$0.37	$0.23	$0.00	$0.25	$0.12	$0.00	$0.00	$19.65	$25.73
3rd 60% 1601-2400 hours OJT	60.00	$14.61	$6.50	$0.44	$0.28	$0.00	$4.40	$0.23	$0.00	$0.00	$26.46	$33.77
4th-65% 2401-3200 hours OJT	65.00	$15.83	$6.50	$0.47	$0.30	$0.00	$4.40	$0.23	$0.00	$0.00	$27.73	$35.64
5th70% 3201-4000 hours OJT	70.00	$17.04	$6.50	$0.51	$0.32	$0.00	$4.40	$0.23	$0.00	$0.00	$29.00	$37.53
6th 75% 4001-4800 hours OJT	75.01	$18.26	$6.50	$0.55	$0.35	$0.00	$4.40	$0.23	$0.00	$0.00	$30.29	$39.43

Special Calculation Note : Other is National Electrical Industry Fund (NEIF).

Ratio :

1-3 Technician to 2 Apprentice
4-6 Technician to 4 Apprentice
7-9 Technician to 6 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, HARDIN, LOGAN, MERCER, SHELBY, VAN WERT, WYANDOT*

Special Jurisdictional Note : In Wyandot County the following townships are included: (Crawford, Jackson, Marseilles, Mifflin, Ridgeland, Ridge and Salem)

Details :

Installer Technician A: has 5 years of experience and training, successfully completed classroom and OJT requirements of the JATC Administered Apprenticeship Program, pass and maintained BICSI Installer Level 1, BICSI Installer Level 2 and BICSI Technician level. A Journeyman Installer/Technician "A" is a Journeyman Installer/Technician B with 5 years experience & training and who holds a current BICSI Technician Certification.

Installer Technician B; shall have 4 years of experience & training, successfully completed Classroom & OJT requirements of JATC Administrated Apprenticeship Program, pass and maintained BICSI

Installer Level 1 and BICSI Installer Level 2 or has passed & maintained BISCI Installer Level 2.

An Apprentice/Installer shall be an individual currently participating in the JATC Administered Apprenticeship Program completing classroom and OJT requirements as specified by JATC.

An employee who is required to wear a pager after hours will receive an additional 1.00 per hour for all hours worked.
Work covers but not limited to: low voltage construction, installation, maintenance, and removal of teledata facilities (voice, data,video) including outside plant, telephone and data inside wire, interconnect, terminal equipment, central offices, PABX, fiber optic cable and equipment, railroad communications, micro waves, V-sAT, by-pass, CATV, WAN, wide area networks, LAN and ISDN.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Electrical Local 32

Change # : LCR02-2019fbLoc32

Craft : Electrical **Effective Date :** 12/02/2019 **Last Posted :** 11/06/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Electrician	$31.37		$8.90	$5.15	$1.25	$0.00	$3.00	$0.94	$0.00	$0.00	$50.61	$66.29
Apprentice	**Percent**											
1st period 0-1000 hrs	50.00	$15.69	$8.90	$0.25	$0.63	$0.00	$0.00	$0.47	$0.00	$0.00	$25.93	$33.78
2nd period 1001-2000 hrs	50.00	$15.69	$8.90	$0.25	$0.63	$0.00	$0.00	$0.47	$0.00	$0.00	$25.93	$33.78
3rd period 2001- 3500 hrs	55.00	$17.25	$8.90	$2.83	$0.69	$0.00	$1.65	$0.52	$0.00	$0.00	$31.84	$40.47
4th period 3501-5000 hrs	65.00	$20.39	$8.90	$3.35	$0.82	$0.00	$1.95	$0.61	$0.00	$0.00	$36.02	$46.22
5th period 5001-6500 hrs	75.00	$23.53	$8.90	$3.86	$0.94	$0.00	$2.25	$0.71	$0.00	$0.00	$40.19	$51.95
6th period 6501-8000 hrs	85.00	$26.66	$8.90	$4.38	$1.07	$0.00	$2.55	$0.80	$0.00	$0.00	$44.36	$57.70

Special Calculation Note : OTHER IS: NEBF

Ratio :

Each Job Site shall be allowed 3 Journeymen to 2 Apprentices as illustrated below:
1 to 3 Journeymen to 2 Apprentices
4 to 6 Journeymen to 4 Apprentices
7 to 9 Journeymen to 6 Apprentices

The first person assigned to any job site shall be a Journeyman Wireman.

Jurisdiction (* denotes special jurisdictional note) :
ALLEN, AUGLAIZE, HARDIN, LOGAN, MERCER, SHELBY, VAN WERT, WYANDOT*

Special Jurisdictional Note : In Wyandot County the following townships are included: Crawford, Jackson, Marseilles, Mifflin, Ridgeland, Ridge and Salem.

Details :

A Certified Welder will receive $1.50 per hour above the Journeyman rate. Welders welding on galvanized shall receive $1.50 per hour above the Journeyman rate.
All work over 35 feet but less than 60 feet shall receive $.75 per hour above the Journeyman rate.
All work 60 feet or over shall receive $1.50 per hour above the Journeyman rate.
When using a JLG-typ equipment or bucket truck is used there will be no high pay unless the work is over 60 feet.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Electrical Local 245 High Tension Pipe Type Cable

Change # : LCN01-2019fbLoc245out

Craft : Lineman **Effective Date :** 01/01/2020 **Last Posted :** 12/24/2019

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Electrical Lineman	$44.42	$6.50	$1.33	$0.44	$0.00	$10.66	$0.00	$0.00	$0.00	$63.35	$85.56
Cert. Lineman Welder	$44.42	$6.50	$1.33	$0.44	$0.00	$10.66	$0.00	$0.00	$0.00	$63.35	$85.56
Cert. Cable Splicer	$44.42	$6.50	$1.33	$0.44	$0.00	$10.66	$0.00	$0.00	$0.00	$63.35	$85.56
Equipment Mechanic C	$28.45	$6.50	$0.85	$0.28	$0.00	$6.83	$0.00	$0.00	$0.00	$42.91	$57.14
Equipment Mechanic B	$31.87	$6.50	$0.96	$0.32	$0.00	$7.65	$0.00	$0.00	$0.00	$47.30	$63.24
Equipment Mechanic A	$35.30	$6.50	$1.06	$0.35	$0.00	$8.47	$0.00	$0.00	$0.00	$51.68	$69.33
Equipment Operator C	$28.45	$6.50	$0.85	$0.28	$0.00	$6.83	$0.00	$0.00	$0.00	$42.91	$57.14
Equipment Operator B	$35.30	$6.50	$1.06	$0.35	$0.00	$8.47	$0.00	$0.00	$0.00	$51.68	$69.33
Equipment Operator A	$39.84	$6.50	$1.20	$0.40	$0.00	$9.56	$0.00	$0.00	$0.00	$57.50	$77.42
Groundman Truck Driver 0 to 12 Months	$22.21	$6.50	$0.67	$0.22	$0.00	$5.33	$0.00	$0.00	$0.00	$34.93	$46.03
Groundman Truck Driver 0 to 12 Months with CDL	$24.43	$6.50	$0.73	$0.24	$0.00	$5.86	$0.00	$0.00	$0.00	$37.76	$49.97
Groundman Truck Driver 1	$24.43	$6.50	$0.73	$0.24	$0.00	$5.86	$0.00	$0.00	$0.00	$37.76	$49.97

Year or More												
Groundman Truck Driver 1 Year or More with CDL	$28.87		$6.50	$0.87	$0.29	$0.00	$6.93	$0.00	$0.00	$0.00	$43.46	$57.89
Lineman Apprentice	**Percent**											
1st 6 Month	60.00	$26.65	$6.50	$0.80	$0.27	$0.00	$6.40	$0.00	$0.00	$0.00	$40.62	$53.95
2nd 6 Month	65.00	$28.87	$6.50	$0.87	$0.29	$0.00	$6.93	$0.00	$0.00	$0.00	$43.46	$57.90
3rd 6 Month	70.00	$31.09	$6.50	$0.93	$0.31	$0.00	$7.46	$0.00	$0.00	$0.00	$46.29	$61.84
4th 6 Month	75.00	$33.32	$6.50	$1.00	$0.33	$0.00	$8.00	$0.00	$0.00	$0.00	$49.14	$65.80
5th 6 Month	80.00	$35.54	$6.50	$1.07	$0.36	$0.00	$8.53	$0.00	$0.00	$0.00	$52.00	$69.76
6th 6 Month	85.00	$37.76	$6.50	$1.13	$0.38	$0.00	$9.06	$0.00	$0.00	$0.00	$54.83	$73.71
7th 6 Month	90.00	$39.98	$6.50	$1.20	$0.40	$0.00	$9.60	$0.00	$0.00	$0.00	$57.68	$77.67

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

1 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, DEFIANCE, ERIE, FULTON, HANCOCK, HARDIN, HENRY, HURON, LUCAS, OTTAWA, PAULDING, PUTNAM, SANDUSKY, SENECA, VAN WERT, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

A groundman when directed shall assist a Journeymen in the performance of his/her work on the ground, including the use of hand tools. A Groundman, Under no circumstances , shall this classification climb poles, towers, ladders, or work from an elevated platform or bucket truck. Heli - Arc Welding will be paid $.30 above Journeyman rate. Additional compensation of 10% over the Journeyman Lineman and Journeyman Technician for performing work on structures outside of buildings such as water towers, smoke stacks, radio and television towers, more than 75' above the ground.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Electrical Local 245 Outside Utility Power

Change # : LCN01-2019fbLoc245out

Craft : Lineman **Effective Date :** 01/01/2020 **Last Posted :** 12/24/2019

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Electrical Lineman	$42.10	$6.50	$1.26	$0.42	$0.00	$10.10	$0.00	$0.00	$0.00	$60.38	$81.43
Substation Technician	$42.10	$6.50	$1.26	$0.42	$0.00	$10.10	$0.00	$0.00	$0.00	$60.38	$81.43
Cable Splicer	$44.08	$6.50	$1.32	$0.44	$0.00	$10.58	$0.00	$0.00	$0.00	$62.92	$84.96
Equipment Mechanic C	$26.92	$6.50	$0.81	$0.27	$0.00	$6.46	$0.00	$0.00	$0.00	$40.96	$54.42
Equipment Mechanic B	$30.18	$6.50	$0.91	$0.30	$0.00	$7.24	$0.00	$0.00	$0.00	$45.13	$60.22
Equipment Mechanic A	$33.43	$6.50	$1.00	$0.33	$0.00	$8.02	$0.00	$0.00	$0.00	$49.28	$65.99
Equipment Operator C	$26.92	$6.50	$0.81	$0.27	$0.00	$6.46	$0.00	$0.00	$0.00	$40.96	$54.42
Equipment Operator B	$33.43	$6.50	$1.00	$0.33	$0.00	$8.02	$0.00	$0.00	$0.00	$49.28	$65.99
Equipment Operator A	$37.77	$6.50	$1.13	$0.38	$0.00	$9.06	$0.00	$0.00	$0.00	$54.84	$73.72
Groundman Truck Driver 0 to 12 Months	$21.05	$6.50	$0.63	$0.21	$0.00	$5.05	$0.00	$0.00	$0.00	$33.44	$43.97
Groundman Truck Driver 0 to 12 Months with CDL	$23.16	$6.50	$0.69	$0.23	$0.00	$5.56	$0.00	$0.00	$0.00	$36.14	$47.72
Groundman Truck Driver 1 Year or More	$23.16	$6.50	$0.69	$0.23	$0.00	$5.56	$0.00	$0.00	$0.00	$36.14	$47.72

Groundman Truck Driver 1 Year or More with CDL	$27.37		$6.50	$0.82	$0.27	$0.00	$6.57	$0.00	$0.00	$0.00	$41.53	$55.22
Lineman Apprentice	**Percent**											
1st 6 Month	60.00	$25.26	$6.50	$0.76	$0.25	$0.00	$6.06	$0.00	$0.00	$0.00	$38.83	$51.46
2nd 6 Month	65.00	$27.37	$6.50	$0.82	$0.27	$0.00	$6.57	$0.00	$0.00	$0.00	$41.53	$55.21
3rd 6 Month	70.00	$29.47	$6.50	$0.88	$0.29	$0.00	$7.07	$0.00	$0.00	$0.00	$44.21	$58.95
4th 6 Month	75.00	$31.58	$6.50	$0.95	$0.32	$0.00	$7.58	$0.00	$0.00	$0.00	$46.93	$62.71
5th 6 Month	80.00	$33.68	$6.50	$1.01	$0.34	$0.00	$8.08	$0.00	$0.00	$0.00	$49.61	$66.45
6th 6 Month	85.00	$35.79	$6.50	$1.07	$0.36	$0.00	$8.59	$0.00	$0.00	$0.00	$52.31	$70.20
7th 6 Month	90.00	$37.89	$6.50	$1.14	$0.38	$0.00	$9.09	$0.00	$0.00	$0.00	$55.00	$73.94

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

1 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, DEFIANCE, ERIE, FULTON, HANCOCK, HARDIN, HENRY, HURON, LUCAS, OTTAWA, PAULDING, PUTNAM, SANDUSKY, SENECA, VAN WERT, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

A groundman when directed shall assist a Journeymen in the performance of his/her work on the ground, including the use of hand tools. A Groundman, Under no circumstances , shall this classification climb poles, towers, ladders, or work from an elevated platform or bucket truck. Heli - Arc Welding will be paid $.30 above Journeyman rate. Additional compensation of 10% over the Journeyman Lineman and Journeyman Technician for performing work on structures outside of buildings such as water towers, smoke stacks, radio and television towers, more than 75' above the ground.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Elevator Local 44

Change # : LCN01-2020fbLoc44

Craft : Elevator **Effective Date :** 03/04/2020 **Last Posted :** 03/04/2020

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Elevator Mechanic	$51.37		$15.73	$10.21	$0.63	$4.11	$8.20	$1.93	$0.00	$0.00	$92.18	$117.87
Assistant Mechanic	$41.08		$15.73	$10.21	$0.63	$2.46	$8.20	$1.55	$0.00	$0.00	$79.86	$100.40
Apprentice	**Percent**											
Apprentice												
0-6 months Probation	50.00	$25.68	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25.68	$38.53
1st year	55.00	$28.25	$15.73	$10.21	$0.63	$1.54	$8.20	$1.06	$0.00	$0.00	$65.62	$79.75
2nd year	65.00	$33.39	$15.73	$10.21	$0.63	$1.69	$8.20	$1.26	$0.00	$0.00	$71.11	$87.81
3rd year	70.00	$35.96	$15.73	$10.21	$0.63	$2.16	$8.20	$1.35	$0.00	$0.00	$74.24	$92.22
4th year	80.00	$41.10	$15.73	$10.21	$0.63	$2.45	$8.20	$1.55	$0.00	$0.00	$79.87	$100.41
Helper	70.00	$35.96	$15.73	$10.21	$0.63	$2.16	$8.20	$1.35	$0.00	$0.00	$74.24	$92.22

Special Calculation Note : OTHER IS :HOLIDAY PAY

Ratio :

The total number of Helpers & Apprentices and Assistant Mechanic employed shall not exceed the number of Mechanics on any one job, except on jobs where (2) teams or more are working, (1) extra Helper, Apprentice or Assistant Mechanic may be employed for the first (2) teams and an extra Helper, Apprentice or Assistant Mechanic for each additional (3) teams. Further, the Company may use as many Helpers, Apprentices and Assistant Mechanics as best suits his convenience under the direction of a Mechanic in wrecking old plants and in handling and hoisting material, and on foundation work. When removing old and installing new cables on existing elevator

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, CRAWFORD, DEFIANCE, ERIE, FULTON, HANCOCK, HARDIN, HENRY, HURON, LUCAS, MERCER, OTTAWA, PAULDING, PUTNAM, SANDUSKY, SENECA, VAN WERT, WILLIAMS, WOOD, WYANDOT

installations, the Company may use two (2) Helpers, Apprentices or Assistant Mechanics to one (1) Mechanic.

Special Jurisdictional Note :

Details :

A Helper or Apprentice certified to weld shall be paid mechanic's rate when performing welding (excluding tack welding).

Prevailing Wage Rate
Skilled Crafts

Name of Union: Glazier Local 1020

Change # : LCN01-2018fbLoc1020

Craft : Glazier **Effective Date :** 02/21/2018 **Last Posted :** 02/21/2018

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Glazier	$20.59		$3.08	$3.04	$0.15	$0.00	$0.00	$4.00	$0.00	$0.00	$30.86	$41.15
Apprentice	Percent											
1st 6 months	50.00	$10.30	$3.08	$3.04	$0.15	$0.00	$0.00	$4.00	$0.00	$0.00	$20.56	$25.71
2nd 6 months	55.00	$11.32	$3.08	$3.04	$0.15	$0.00	$0.00	$4.00	$0.00	$0.00	$21.59	$27.26
3rd 6 months	60.00	$12.35	$3.08	$3.04	$0.15	$0.00	$0.00	$4.00	$0.00	$0.00	$22.62	$28.80
4th 6 months	65.00	$13.38	$3.08	$3.04	$0.15	$0.00	$0.00	$4.00	$0.00	$0.00	$23.65	$30.35
5th 6 months	70.00	$14.41	$3.08	$3.04	$0.15	$0.00	$0.00	$4.00	$0.00	$0.00	$24.68	$31.89
6th 6 months	75.00	$15.44	$3.08	$3.04	$0.15	$0.00	$0.00	$4.00	$0.00	$0.00	$25.71	$33.43
7th 6 months	80.00	$16.47	$3.08	$3.04	$0.15	$0.00	$0.00	$4.00	$0.00	$0.00	$26.74	$34.98
8th 6 months	90.00	$18.53	$3.08	$3.04	$0.15	$0.00	$0.00	$4.00	$0.00	$0.00	$28.80	$38.07

Special Calculation Note : Other is: In lieu of paid holidays and paid vacations $4.00 per hour premium is added

Ratio :

1Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, HANCOCK, HARDIN, LOGAN, MERCER, PAULDING, PUTNAM, SHELBY, VAN WERT, WYANDOT

Special Jurisdictional Note :

Details :

Journeymen in charge of 6 or more men shall receive $1.00 an hour premium.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Ironworker Local 147 HevHwy

Change # : LCN01-2015fbLoc147HevHwy

Craft : Ironworker **Effective Date :** 10/07/2015 **Last Posted :** 10/07/2015

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Ironworker	$25.39		$6.60	$9.20	$0.42	$0.00	$3.80	$0.62	$0.00	$0.00	$46.03	$58.73
Apprentice	Percent											
1st 6 months	55.00	$13.96	$6.60	$9.20	$0.42	$0.00	$3.80	$0.62	$0.00	$0.00	$34.60	$41.59
2nd 6 months	60.00	$15.23	$6.60	$9.20	$0.42	$0.00	$3.80	$0.62	$0.00	$0.00	$35.87	$43.49
3rd 6 months	65.00	$16.50	$6.60	$9.20	$0.42	$0.00	$3.80	$0.62	$0.00	$0.00	$37.14	$45.40
4th 6 months	70.00	$17.77	$6.60	$9.20	$0.42	$0.00	$3.80	$0.62	$0.00	$0.00	$38.41	$47.30
5th 6 months	75.00	$19.04	$6.60	$9.20	$0.42	$0.00	$3.80	$0.62	$0.00	$0.00	$39.68	$49.20
6th 6 months	80.00	$20.31	$6.60	$9.20	$0.42	$0.00	$3.80	$0.62	$0.00	$0.00	$40.95	$51.11
7th 6 months	85.00	$21.58	$6.60	$9.20	$0.42	$0.00	$3.80	$0.62	$0.00	$0.00	$42.22	$53.01
8th 6 months	90.00	$22.85	$6.60	$9.20	$0.42	$0.00	$3.80	$0.62	$0.00	$0.00	$43.49	$54.92

Special Calculation Note : *Pension & Health and Welfare are paid on hours worked. **Annuity will be based on hours paid (time and a half = $4.88 per hour and double time = $6.50 per hour).

Ratio :

4 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN*, DEFIANCE, MERCER, PAULDING, PUTNAM*, VAN WERT*, WILLIAMS*

Special Jurisdictional Note : Allen County Twps included: Monroe, Richland. Putnam County Twps included: Jennings, Sugar Creek, Pleasant, Union, Jackson, Monterey, Perry, Greensburg, Ottawa, Palmer, Monroe. VanWert County Twps included: York, Liberty, Willshire, Harrison, Pleasant, Ridge, Washington, Jackson, Hoaglin, Union, Tully. Williams County Twps included: Pulaski, Center, St. Joseph, Florence, Superior, Jefferson,

Northwest, Bridgewater, Springfield.

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Ironworker Local 147

Change # : LCN01-2016fbLoc147

Craft : Ironworker **Effective Date :** 06/29/2016 **Last Posted :** 06/29/2016

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Ironworker	$25.39		$7.10	$9.50	$0.57	$0.00	$4.05	$0.27	$0.00	$0.00	$46.88	$59.58
Apprentice	Percent											
1st 6 months	55.00	$13.96	$7.10	$9.50	$0.57	$0.00	$4.05	$0.27	$0.00	$0.00	$35.45	$42.44
2nd 6 months	60.00	$15.23	$7.10	$9.50	$0.57	$0.00	$4.05	$0.27	$0.00	$0.00	$36.72	$44.34
3rd 6 months	65.00	$16.50	$7.10	$9.50	$0.57	$0.00	$4.05	$0.27	$0.00	$0.00	$37.99	$46.25
4th 6 months	70.00	$17.77	$7.10	$9.50	$0.57	$0.00	$4.05	$0.27	$0.00	$0.00	$39.26	$48.15
5th 6 months	75.00	$19.04	$7.10	$9.50	$0.57	$0.00	$4.05	$0.27	$0.00	$0.00	$40.53	$50.05
6th 6 months	80.00	$20.31	$7.10	$9.50	$0.57	$0.00	$4.05	$0.27	$0.00	$0.00	$41.80	$51.96
7th 6 months	85.00	$21.58	$7.10	$9.50	$0.57	$0.00	$4.05	$0.27	$0.00	$0.00	$43.07	$53.86
8th 6 months	90.00	$22.85	$7.10	$9.50	$0.57	$0.00	$4.05	$0.27	$0.00	$0.00	$44.34	$55.77

Special Calculation Note : Other is Building Industry.

Ratio :

4 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN*, DEFIANCE, MERCER, PAULDING, PUTNAM*, VAN WERT*, WILLIAMS*

Special Jurisdictional Note : Allen County Twps included: Monroe, Richland. Putnam County Twps included: Jennings, Sugar Creek, Pleasant, Union, Jackson, Monterey, Perry, Greensburg, Ottawa, Palmer, Monroe. VanWert County Twps included: York, Liberty, Willshire, Harrison, Pleasant, Ridge, Washington, Jackson, Hoaglin, Union, Tully. Williams County Twps included: Pulaski, Center, St. Joseph, Florence, Superior, Jefferson, Northwest, Bridgewater, Springfield.

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Ironworker Local 290

Change # : LCN01-2019fbLoc290

Craft : Ironworker **Effective Date :** 06/01/2019 **Last Posted :** 05/23/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Ironworker Structural	$29.23		$8.20	$9.50	$0.65	$0.00	$4.00	$0.02	$0.00	$0.00	$51.60	$66.21
Welder	$29.23		$8.20	$9.50	$0.65	$0.00	$4.00	$0.02	$0.00	$0.00	$51.60	$66.21
Fence Erector	$29.23		$8.20	$9.50	$0.65	$0.00	$4.00	$0.02	$0.00	$0.00	$51.60	$66.21
Reinforcing Rods	$29.23		$8.20	$9.50	$0.65	$0.00	$4.00	$0.02	$0.00	$0.00	$51.60	$66.21
Machinery Mover	$29.23		$8.20	$9.50	$0.65	$0.00	$4.00	$0.02	$0.00	$0.00	$51.60	$66.21
Sheeter	$29.23		$8.20	$9.50	$0.65	$0.00	$4.00	$0.02	$0.00	$0.00	$51.60	$66.21
Metal Building Erector	$29.23		$8.20	$9.50	$0.65	$0.00	$4.00	$0.02	$0.00	$0.00	$51.60	$66.21
Rigger & Erector	$29.29		$8.20	$9.50	$0.65	$0.00	$4.00	$0.02	$0.00	$0.00	$51.66	$66.30
Apprentice	**Percent**											
1st year	65.15	$19.04	$8.20	$9.50	$0.65	$0.00	$2.50	$0.02	$0.00	$0.00	$39.91	$49.44
2nd year	75.15	$21.97	$8.20	$9.50	$0.65	$0.00	$2.50	$0.02	$0.00	$0.00	$42.84	$53.82
3rd year	85.15	$24.89	$8.20	$9.50	$0.65	$0.00	$2.50	$0.02	$0.00	$0.00	$45.76	$58.20
4th year	95.15	$27.81	$8.20	$9.50	$0.65	$0.00	$2.50	$0.02	$0.00	$0.00	$48.68	$62.59

Special Calculation Note : Other is for Industry Fund.

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN*, AUGLAIZE, BUTLER*, CHAMPAIGN*, CLARK, CLINTON, DARKE, FAYETTE*, GREENE, HARDIN*, HIGHLAND*, LOGAN*, MADISON*, MERCER*, MIAMI, MONTGOMERY, PREBLE, SHELBY, VAN WERT*, WARREN*

Special Jurisdictional Note : Allen County Twps included are: Auglaize, Perry, Shawnee, Amanda, Spencer, Marion, Sugar Creek, American, Bath, Jackson. Butler County Twps included are: Milford, Wayne, Madison, Lemon. Champaign Cnty Twps included are: Union, Urbana, Jackson, Concord, Salem, Mad River, Johnson, Harrison, Adams. Fayette County Twps included are: Green, Jasper, Concord, Jefferson. Hardin County Twps included are: Round Head, Marion, Liberty. Highland County Twps included are: Fairfield, Penn, Union, Marshall, Liberty, Paint, Brush Creek. Logan County Twps included are: Richland, Stokes, Bloomfield, Washington, Harrison, McArthur, Lake, Liberty, Pleasant, Miami. Madison County Twps included are: Stokes. Mercer County Twps included are: Dublin, Washington, Jefferson, Recovery, Gibson, Union, Liberty, Butler, Granville, Center, Hopewell, Franklin, Marion. VanWert County Twps included are: Jennings. Warren County Twps included are: Franklin, Clear Creek, Turtle Creek, Wayne, Massie, Washington, Salem, Union.

Details :

Structural Iron Work but not limited to:field fabrication, all loading to and including the erecting,rigging,assembly,dismantling, placing, temporary and permanent securing by any means of all structural iron,steel,ornamental lead,bronze,brass,copper,aluminum,glass all ferrous and non ferrous metal and composite material, precast prestressed and post-stressed concrete structures. Bridges and bridge rails,bridge viaducts,bucks bulkheads,bumper and bumper post,canopies and unistrut canopies,corrugated ferrous and non ferrous sheets when attached to steel frames,columns,beams,bar-joists,trusses,grinders,roof decking,electrical supports,elevator cars,elevator fronts and enclosures,erection of steel towers,flag poles, gymnasium equipment,stadium and arena seating,jail cell work,jail cell beds,benches,bunks,chairs,tables,mirrors,jail cell access doors,rigging and installation of machinery and equipment(erecting,aligning,anchoring and dismantling, erection and dismantling of tower cranes,derrick monorail systems, Chicago booms,overhead cranes,gantries,material and personnel hoists,tanks,hoppers and conveyors. All pre-engineered metal buildings and their entirety including siding,roofing, gutters, downspouts and erection of all.

Ornamental Iron Work but not limited to:all work in connection with field fabrication,handling including loading/off loading,sorting,cutting,fastening,anchoring,bending,hoisting,placing,burning,welding,and tying,dismantling of all materials used in miscellaneous iron or steel, for stairs,hand railings,rolling doors, rolling gates,rolling shutters,fence,windows,curtain wall,erection and welding of all metal, sash,architectural and ornamental treatments, but not necessarily limited to all sizes and types of ornamental,steel iron,lead,bronze,brass,copper,aluminum,all ferrous and non ferrous metals and composite materials
.

Fence Erector Iron Worker but not limited to: All work in connection with the field fabrication and erection of chain link fence,which includes but not limited to the loading and of the fence fabric and posts also the installation of the above.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Labor HevHwy 3

Change # : LCN01-2019fbLocalHevHwy3

Craft : Laborer Group 1 **Effective Date :** 05/23/2019 **Last Posted :** 05/23/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Laborer Group 1	$31.62		$7.00	$3.70	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$42.87	$58.68
Group 2	$31.79		$7.00	$3.70	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$43.04	$58.94
Group 3	$32.12		$7.00	$3.70	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$43.37	$59.43
Group 4	$32.57		$7.00	$3.70	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$43.82	$60.11
Watch Person	$24.35		$7.00	$3.70	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$35.60	$47.78
Apprentice	**Percent**											
0-1000 hrs	60.00	$18.97	$7.00	$3.70	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$30.22	$39.71
1001-2000 hrs	70.00	$22.13	$7.00	$3.70	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$33.38	$44.45
2001-3000 hrs	80.00	$25.30	$7.00	$3.70	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$36.55	$49.19
3001-4000 hrs	90.00	$28.46	$7.00	$3.70	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$39.71	$53.94
More than 4000 hrs	100.00	$31.62	$7.00	$3.70	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$42.87	$58.68

Special Calculation Note : Watchmen have no Apprentices. Tunnel Laborer rate with air-pressurized add $1.00 to the above wage rate.

Ratio :

1 Journeymen to 1 Apprentice
3 Journeymen to 1 Apprentice thereafter

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY,

HIGHLAND, HOCKING, HOLMES, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, MADISON, MARION, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, PAULDING, PERRY, PICKAWAY, PIKE, PREBLE, PUTNAM, RICHLAND, ROSS, SCIOTO, SENECA, SHELBY, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WYANDOT

Special Jurisdictional Note : Hod Carriers and Common Laborers - Heavy, Highway, Sewer, Waterworks, Utility, Airport, Railroad, Industrial and Building Site, Sewer Plant, Waste Water Treatment Facilities Construction

Details :

Group 1

Laborer (Construction); Plant Laborer or Yardman, Right-of-way Laborer, Landscape Laborer, Highway Lighting Worker, Signalization Worker, (Swimming) Pool Construction Laborer, Utility Man, *Bridge Man, Handyman, Joint Setter, Flagperson, Carpenter Helper, Waterproofing Laborer, Slurry Seal, Seal Coating, Surface Treatment or Road Mix Laborer, Riprap Laborer & Grouter, Asphalt Laborer, Dump Man (batch trucks), Guardrail & Fence Installer, Mesh Handler & Placer, Concrete Curing Applicator, Scaffold Erector, Sign Installer, Hazardous Waste (level D), Diver Helper, Zone Person and Traffic Control.

*Bridge Man will perfomr work as per the October 31, 1949, memorandum on concrete forms, byand between the United Brotherhood of Caprpenters and Joiners of Americ and the Laborers' International Union of North America, which states in; "the moving, cleaning, oiling and carrying to the next point of erection, and the stripping of forms which are not to be re-used, and forms on all flat arch work shall be done by memebers of the Laborers' International Union of North America."

Group 2

Asphalt Raker, Screwman or Paver, Concrete Puddler, Kettle Man (pipeline), All Machine-Driven Tools (Gas, Electric, Air), Mason Tender, Brick Paver, Mortar Mixer, Skid Steer, Sheeting & Shoring Person, Surface Grinder Person, Screedperson, Water Blast, Hand Held Wand, Power Buggy or Power Wheelbarrow, Paint Striper, Plastic fusing Machine Operator, Rodding Machine Operator, Pug Mill Operator, Operator of All Vacuum Devices Wet or Dry, Handling of all Pumps 4 inches and under (gas, air or electric), Diver, Form Setter, Bottom Person, Welder Helper (pipeline), Concrete Saw Person, Cutting with Burning Torch, Pipe Layer, Hand Spiker (railroad), Underground Person (working in sewer and waterline, cleaning, repairing and reconditioning). Tunnel Laborer (without air),Caisson, Cofferdam (below 25 feet deep), Air Track and Wagon Drill, Sandblaster Nozzle Person, Hazardous Waste (level B), ***Lead Abatement, Hazardous Waste (level C)

***Includes the erecting of structures for the removal, including the encapsulation and containment of Lead abatement process.

Group 3

Blast and Powder Person, Muckers will be defined as shovel men working directly with the miners, Wrencher (mechanical joints & utility pipeline), Yarner, Top Lander, Hazardous Waste (level A), Concrete Specialist, Curb Setter and Cutter, Grade Checker, Concrete Crew in Tunnels. Utility pipeline Tappers, Waterline, Caulker, Signal Person will receive the rate equal to the rate paid the Laborer classification for which the Laborer is signaling.

Group 4
Miner,Welder, Gunite Nozzle Person

A.) The Watchperson shall be responsible to patrol and maintain a safe traffic zone including but not limited to barrels, cones, signs, arrow boards, message boards etc.
The responsibility of a watchperson is to see that the equipment, job and office trailer etc. are secure.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Labor Local 329

Change # : LCN01-2019fbLoc329

Craft : Laborer **Effective Date :** 06/26/2019 **Last Posted :** 06/26/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Laborer Group 1	$26.56		$7.00	$3.70	$0.40	$0.00	$0.00	$0.00	$0.15	$0.00	$37.81	$51.09
Group 2	$26.71		$7.00	$3.70	$0.40	$0.00	$0.00	$0.00	$0.15	$0.00	$37.96	$51.32
Group 3	$26.86		$7.00	$3.70	$0.40	$0.00	$0.00	$0.00	$0.15	$0.00	$38.11	$51.54
Group 4	$27.06		$7.00	$3.70	$0.40	$0.00	$0.00	$0.00	$0.15	$0.00	$38.31	$51.84
Apprentice	**Percent**											
0-1000 hrs & 108 hrs Instruction	60.00	$15.94	$7.00	$3.70	$0.40	$0.00	$0.00	$0.00	$0.15	$0.00	$27.19	$35.15
1001-2000 hrs & 216 hrs Instruction	70.00	$18.59	$7.00	$3.70	$0.40	$0.00	$0.00	$0.00	$0.15	$0.00	$29.84	$39.14
2001-3000 hrs & 324 hrs Instruction	80.00	$21.25	$7.00	$3.70	$0.40	$0.00	$0.00	$0.00	$0.15	$0.00	$32.50	$43.12
3001-4,000 hrs & 432 hrs Instruction	90.00	$23.90	$7.00	$3.70	$0.40	$0.00	$0.00	$0.00	$0.15	$0.00	$35.15	$47.11
More than 4000 Hours	100.00	$26.56	$7.00	$3.70	$0.40	$0.00	$0.00	$0.00	$0.15	$0.00	$37.81	$51.09

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

1 Journeyman to 1 Apprentice then 4 to 1 thereafter per project

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, MERCER, PAULDING, PUTNAM, SHELBY, VAN WERT

Special Jurisdictional Note :

Details :

Group 1

Building Laborer, Carpenter Tender, Flagman, Signal Man, Rigging/Hooking/unhooking of construction material, utility construction laborer, guardrail erector, fence installer, landscape laborer, laser beam set-up man, grade checker, power wheelbarrow or power buggy, removal of asbestos, hazardous waste (Levels C & D), drinking water supplier, warehouse/tool man, safety man, confined space/hole watch attendant, fire watch, parking attendant, watchman, time/bookkeeper.

Group 2

Vibrators, Cement Finisher Helper, cement Raker, pump hose nozzle man, Asphalt Raker, Tamper & Packer, Pump Man Under 4", Discharge, Caisson, Cofferdam, Tunnel, Spiker Railroad (By Hand), Pot Tender, Torch Man, Demolition, All Machine Driven Tools (Gas, Electric, Air).

Group 3

Plaster Tender, Mortar Mixer, Cylinder, Shaft, Sewer, Water Conduit, Gas, Oil, Pipeline, Except Mainlines, Sewer Bottom Man, Sewer Pipe Layer, Manhole Builder, Blaster Helper, air track/Wagon Drill Helper, Jack Hammer, Gunnite Operator, Mucker (Tunnel & Caisson) Free Air, Miner, Sand Blaster, Blaster-Powder Man, Wagon drill/Operator, The removal of Lead or Toxic and Hazardous Waste materials (Level A & B).

Group 4

Mason Tender, scaffold builder, truck driver with CDL, welder, skid loader, forklift operator and man lifts.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Operating Engineers - Building Local 18 - Zone III

Change # : LCN01-2019fbLoc18zone3

Craft : Operating Engineer **Effective Date :** 05/01/2019 **Last Posted :** 05/01/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Operator Class 1	$37.14		$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$52.34	$70.91
Class 2	$37.02		$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$52.22	$70.73
Class 3	$35.98		$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$51.18	$69.17
Class 4	$34.80		$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$50.00	$67.40
Class 5	$29.34		$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$44.54	$59.21
Class 6	$37.39		$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$52.59	$71.28
Class 7	$37.64		$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$52.84	$71.66
Class 8	$38.14		$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$53.34	$72.41
Class 9	$38.39		$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$53.59	$72.78
Apprentice	**Percent**											
1st Year	50.00	$18.57	$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$33.77	$43.06
2nd Year	60.00	$22.28	$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$37.48	$48.63
3rd Year	70.00	$26.00	$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$41.20	$54.20
4th Year	80.00	$29.71	$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$44.91	$59.77
Field Mechanic Trainee												
1st Year	50.00	$18.57	$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$33.77	$43.06
2nd Year	60.00	$22.28	$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$37.48	$48.63
3rd Year	70.00	$26.00	$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$41.20	$54.20
4th Year	80.00	$29.71	$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$44.91	$59.77

Special Calculation Note : Other: Education & Safety $0.09

Ratio :

For every (3) Operating Engineer Journeymen employed by the company there may be employed (1) Registered Apprentice or trainee Engineer through the referral when they are available. An

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COSHOCTON,

apprenice, while employed as part of a crew per Article VIII, paragraph 77, will not be subject to the apprenticeship ratios in this collective bargaining agreement

CRAWFORD, DARKE, DEFIANCE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, MADISON, MARION, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WYANDOT

Special Jurisdictional Note :

Details :

**Apprentices will receive a 10% increase on top of the percentages listed above provided they are operating mobile equipment. Mechanic Trainees will receive 10% increase if required to have CDL

Class 1 - Barrier Moving Machine; Boiler Operators or Compressor Operators, when compressor or boiler is mounted on crane (Piggyback Operation); Boom Trucks (all types); Cableways Cherry Pickers; Combination - Concrete Mixers & Towers; All Concrete Pumps with Booms; Cranes (all types) Derricks (all types); Draglines Dredges (dipper, clam or suction) 3-man crew; Elevating Graders or Euclid Loaders; Floating Equipment; Gradalls; Helicopter Operators; hoisting building materials; Helicopter Winch Operators, Hoisting building materials; Hoes (All types); Hoists (with two or more drums in use): Hydraulic Gantry (lift system); Laser Finishing Machines; Lift Slab or Panel Jack Operators; Locomotives (all types); Maintenance Engineers (Mechanic and/or Welder); Mixers, paving (multiple drum); Mobile Concrete Pumps, with booms, Panelboards, (all types on site); Pile Drivers; Power Shovels; Prentice Loader; Rail Tamper (with automatic lifting and aligning device);' Rotary Drills (all) used on caissons for foundations and sub-structure work; Side Booms; Slip Form Pavers; Straddle Carriers (Building Construction on site); Tug Boats. Horizontal Directional Drill, Rough Terrain Fork-lift with Winch/Hoist, Laser Screed, and Like equipment;Compact Cranes,track or rubber over 4,000 pound capacity,self-erecting cranes:stationary,track or truck (all configurations) bucket trench machines (over 24 " wide).

Class 2 - Asphalt Pavers; Bobcat-type and/or skid steer loader with hoe attachment greater than 7000 lbs. Bulldozers; CMI type Equipment; Endloaders; Hydro Milling Machine; Kolman-type Loaders (Dirt Loading); Lead Greasemen; Mucking Machines; Pettibone-Rail Equipment; Power Graders; Power Scoops; Power Scrapers; Push Cats; Vermeer Type Concrete Saw;All rotomills, grinders & planers of all types. Articulating/end dumps (minus $4.00/hour from Class 2 rate)

Class 3 - A Frames; Air Compressors, Pressurizing Shafts or Tunnels; All Asphalt Rollers; Bobcat-type and/or skid steer loader with or without attachments; Boilers (15 lbs pressure and over); All concrete Pumps (without booms with 5 inch system); Fork Lifts (except masonry); Highway Drillers - all types (with integral power); Hoists (with one drum); House Elevators (except those automatic call

button controlled); Man lifts; Mud Jacks; Pressure Grouting; Pump Operators (installing or operating Well Points or other types of Dewatering Systems); Pumps (4 inches and over discharge); Railroad Tie Inserter/Remover; Rotator (Lime-Soil Stabilizer); Submersible Pumps (4 inches and over discharge); Switch & Tie Tampers (without lifting and aligning device); Trench Machines (24 inches and under); Utility Operators; Material hoist/elevators.

Class 4 - Ballast Re-locator; Backfillers and Tampers; Batch Plant Operators; Bar and Joint Installing Machines; Bull Floats; Burlap and Curing Machines; Clefplanes; Compressors, on building construction; Concrete Spreader; Conveyors, used for handling building materials; Concrete Mixers, one bag capacity (side loader); Concrete Mixers, capacity more than one bag; Crushers; Deck Hands; Drum Fireman (in Asphalt Plant); Farm type tractors pulling attachments; Finishing Machines; Form Trenchers; Generators: Gunite Machines; Hydro-Seeders; Pavement Breakers (hydraulic or cable); Post Drivers; Post Hole Diggers; Pressure Pumps (over 1/2 inch discharge); Road Widening Trenchers; Rollers (except asphalt); All Concrete pumps (without Boom with 4 inch or smaller systems); Self-Propelled Power Spreaders; Concrete Spreaders; Self-Propelled Sub-graders; Shotcrete Machines; Tire Repairmen; Tractors, pulling sheepfoot rollers or graders; VAC/ALLS; Vibratory Compactors, with integral power; Welder Operators.

Class 5 - Boilers (less than 15 lbs. pressure); Inboard/outboard Motor Boat Launches; Light Plant Operators; Masonry Fork Lifts; Oilers/Helpers; Power Driven Heaters (oil fired); Power Scrubbers; Power Sweepers; Pumps (under 4 inch discharge); Signalmen, Submersible Pumps (under 4 inch discharge). Directional Drill Locator and Allen Screed Concrete Paver. Fueling and greasing (plus $3.00), compact cranes; track or rubber under 4,000 pounds.

Class 6 - Master Mechanic

Class 7 - Boom & Jib 150 - 180 feet

Class 8 - Boom & Jib 180 - 249 feet

Class 9 - Boom & Jib 250 - or over

Prevailing Wage Rate
Skilled Crafts

Name of Union: Operating Engineers - HevHwy Zone II

Change # : LCN01-2019fbLoc18hevhwyII

Craft : Operating Engineer **Effective Date :** 05/01/2019 **Last Posted :** 05/01/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Operator Class 1	$37.14		$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$52.34	$70.91
Class 2	$37.02		$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$52.22	$70.73
Class 3	$35.98		$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$51.18	$69.17
Class 4	$34.80		$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$50.00	$67.40
Class 5	$29.34		$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$44.54	$59.21
Class 6	$37.39		$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$52.59	$71.28
Apprentice	**Percent**											
1st Year	50.00	$18.57	$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$33.77	$43.06
2nd Year	60.00	$22.28	$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$37.48	$48.63
3rd Year	70.00	$26.00	$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$41.20	$54.20
4th Year	80.00	$29.71	$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$44.91	$59.77
Field Mech Trainee Class 2												
1st year	49.85	$18.51	$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$33.71	$42.97
2nd year	59.79	$22.21	$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$37.41	$48.51
3rd year	69.77	$25.91	$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$41.11	$54.07
4th year	79.75	$29.62	$8.26	$6.00	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$44.82	$59.63

Special Calculation Note : Other: Education & Safety Fund is $0.09 per hour.

Ratio :

For every (3) Operating Engineer Journeymen employed by the company , there may be employed (1) Registered Apprentice or Trainee Engineer through the referral when they are available. An apprentice, while employed as part of a crew per Article VIII paragraph 65, will not be

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE,

subject the apprenticeship ratios in this collective bargaining agreement.	GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, LUCAS, MADISON, MARION, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

**Apprentices will receive a 10% increase on top of the percentages listed above provided they are operating mobile equipment. Mechanic Trainees will receive 10% increase if they are required to have CDL.

Class 1 - Air Compressors on Steel Erection; Barrier Moving Machine; Boiler Operators, on Compressors or Generators, when mounted on a rig: Cableways, Combination Concrete mixers & Towers; Concrete Pumps; Concrete Plants (over 4 yd capacity); Cranes (all types, including Boom Trucks, Cherry Pickers); Derricks; Draglines, Dredgers (dipper, clam or suction); Elevating Graders or Euclid Loaders; Floating Equipment (all types); Gradalls, Helicopter Crew (Operator- hoist or winch); Hoes (all types); Hoisting Engines, on shaft or tunnel work; Hydraulic Gantry (lifting system); Industrial - Type Tractors; Jet Engine Dryers (D8 or D9), Diesel Tractors; Locomotives (standard gage); Maintenance Operators (class A); Mixers, paving (single or double drum); Mucking Machines; Multiple Scrapers; Piledriving Machines (all types); Power Shovels, Prentice Loader; Quad 9 (double pusher); Rail Tamper (with automatic lifting and aligning device); Refrigerating Machines (freezer operation); Side Booms; Slip Form Pavers; Tower Dericks; Tree Shredders; Truck Mounted Concrete Pumps; Tug Boats; Tunnel Machines and /or Mining Machines; Wheel Excavators. Rough Terrain Fork-lift with Winch/Hoist; Compact Cranes, track rubber over 4,000 pound capacity, self-erecting cranes; stationary, track or truck (all configurations) Bucket trench machines (over 24 inches wide).

Class 2 - Asphalt Pavers; Automatic Subgrade Machines, self-propelled (CMI-type); Bobcat-type and /or skid steer loader with hoe attachment greater than 7000 lbs.; Boring Machine Operators (more than 48 inches); Bulldozers; Endloaders; Hydro Milling Machine; Kolman-type Loaders (production type-dirt); Lead Greasemen; Maintenance Operators, Class B (Portage and Summit Counties only); Pettibone-Rail Equipment; Power Graders; Power Scrapers; Push Cats; Lighting and Traffic Signal Installation Equipment includes all groups or classifications; Trench Machines (24inch wide and under); Vermeer Type Concrete saw. Material Transfer Equipment (Shuttle buggy) Asphalt; All rotomills,grinders and planers of all types. Horizontal Directional Drill (Over 50,000 ft.lbs.thrust and over)

Class 3 - A-Frames; Air Compressors, on tunnel work (low Pressure); Asphalt Plant Engineers;

Bobcat-type and/or skid steer loader with or without attachments; Power Boilers (15 lbs pressure and over); Highway Drills (all types); Rollers, asphalt; Pump Operators (installing or operating well Points); Pumps (4 inch and over discharge); Railroad Tie Inserter/Remover; Rotator (lime-soil Stabilizer), Switch & Tie Tampers (without lifting and aligning device); Locomotives (narrow gage); Mixers, concrete (more than one bag capacity); Mixers, one bag capacity (side loader); Utilities Operators, (small equipment); Welding Machines; Material hoist/elevators. Articulating/straight bed end dumps if assigned (minus $4.00 per hour).

Class 4 -Ballast Re-locator; Backfillers, Batch Plants; Bar and Joint Installing Machines; Boring Machine Operators (48 inch or less); Bull Floats; Burlap and Curing Machines; Concrete Plants (capacity 4 yd and under); Conveyors (highway); Concrete Saws (multiple); Crushers; Deckhands; Farm type tractors, with attachments (highway), except masonry; Finishing Machines; Firemen, Floating Equipment (all types); Fork Lifts (highway); Form Trenchers; Hydro Hammers; Hydro Seeders; Pavement Breakers; Plant Mixers; Post Drivers; Post Hole Diggers (power auger); Power Brush Burners; Power Form Handling Equipment; Road Widening Trenchers; Rollers (brick, grade, macadam); Self-Propelled Power Spreaders; Self-Propelled Sub-Graders; Tractors, pulling sheepsfoot rollers or graders; Steam Firemen; Vibratory Compactors, with integral power.

Class 5 - Compressors (portable, Sewer, Heavy and Highway); Generators; Inboard-Outboard Motor Boat Launches; Masonry Fork Lifts; Oilers/Helpers; Power Driven Heaters; Power Scrubbers; Power Sweepers; Pumps (under 4 inch discharge); Signalmen; Drum Fireman (in Asphalt Plant); Oil Heaters (Asphalt Plant); Tire Repairmen; VAC/ALLS; Fueling and greasing (plus $3.00), compact cranes: track or rubber under 4,000 pounds.

Class 6 - Master Mechanic

Prevailing Wage Rate
Skilled Crafts

Name of Union: Painter Local 639 Zone 2 Sign

Change # : LCN01-2016fbLoc639

Craft : Painter **Effective Date :** 08/03/2016 **Last Posted :** 08/03/2016

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Painter Sign Journeyman Tech/Team Leader Class A	$21.25	$1.33	$0.14	$0.00	$0.00	$0.00	$0.57	$0.00	$0.00	$23.29	$33.92
Painter Sign Journeyman Tech/Team Leader Class B	$21.25	$1.33	$0.14	$0.00	$0.41	$0.00	$0.57	$0.00	$0.00	$23.70	$34.32
Painter Sign Journeyman Tech/Team Leader Class C	$21.25	$1.33	$0.14	$0.00	$0.82	$0.00	$0.57	$0.00	$0.00	$24.11	$34.74
Painter Sign Journeyman Tech/Team Leader Class D	$21.25	$1.33	$0.14	$0.00	$1.23	$0.00	$0.57	$0.00	$0.00	$24.52	$35.14
Sign Journeyman Class A	$20.98	$1.33	$0.14	$0.00	$0.00	$0.00	$0.56	$0.00	$0.00	$23.01	$33.50
Sign Journeyman Class B	$20.98	$1.33	$0.14	$0.00	$0.40	$0.00	$0.56	$0.00	$0.00	$23.41	$33.90
Sign Journeyman Class C	$20.98	$1.33	$0.14	$0.00	$0.81	$0.00	$0.56	$0.00	$0.00	$23.82	$34.31
Sign Journeyman Class D	$20.98	$1.33	$0.14	$0.00	$1.21	$0.00	$0.56	$0.00	$0.00	$24.22	$34.71
Tech Sign Fabrication/ Erector Class A	$15.90	$1.33	$0.14	$0.00	$0.00	$0.00	$0.43	$0.00	$0.00	$17.80	$25.75

Tech Sign Fabrication/ Erector Class B	$15.90	$1.33	$0.14	$0.00	$0.31	$0.00	$0.43	$0.00	$0.00	$18.11	$26.06
Tech Sign Fabrication/ Erector Class C	$15.90	$1.33	$0.14	$0.00	$0.61	$0.00	$0.43	$0.00	$0.00	$18.41	$26.36
Tech Sign Fabrication/ Erector Class D	$15.90	$1.33	$0.14	$0.00	$0.92	$0.00	$0.43	$0.00	$0.00	$18.72	$26.67

Special Calculation Note : Other is for paid holidays.

Ratio :

Jurisdiction (* denotes special jurisdictional note) :
ADAMS, ALLEN, AUGLAIZE, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GREENE, HAMILTON, HANCOCK, HARDIN, HENRY, HIGHLAND, HOLMES, HURON, JACKSON, KNOX, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MERCER, MIAMI, MONTGOMERY, MORROW, MUSKINGUM, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PREBLE, PUTNAM, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, WARREN, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :
Class A: less that 1 year.
Class B: 1-3 years.
Class C; 3-10 years.
Class D: More than 10 years.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Painter Local 639

Change # : LCNO1-2015fbLoc639

Craft : Painter **Effective Date :** 06/10/2015 **Last Posted :** 06/10/2015

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Painter Metal Finisher/Helpers											
Top Helper Class A	$19.09	$3.65	$0.00	$0.00	$0.66	$0.00	$0.00	$0.00	$0.00	$23.40	$32.94
Top Helper Class B	$19.09	$3.65	$0.65	$0.00	$1.03	$0.00	$0.37	$0.00	$0.00	$24.79	$34.33
Top Helper Class C	$19.09	$3.65	$1.00	$0.00	$1.76	$0.00	$0.37	$0.00	$0.00	$25.87	$35.41
Helper Class A	$14.69	$3.65	$0.00	$0.00	$0.51	$0.00	$0.00	$0.00	$0.00	$18.85	$26.19
Helper Class B	$14.69	$3.65	$0.65	$0.00	$0.79	$0.00	$0.28	$0.00	$0.00	$20.06	$27.40
Helper Class C	$14.69	$3.65	$1.00	$0.00	$1.64	$0.00	$0.28	$0.00	$0.00	$21.26	$28.60
New Hire 90 Days	$11.00	$3.65	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$14.65	$20.15

Special Calculation Note : Other is Sick and Personal Time

Ratio :

Jurisdiction (* denotes special jurisdictional note) :
ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY,

MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

Top Helper: Shall perform the responsibilities of a Helper and be responsible for the setup, break down, safety and quality of the company's product.
Helper : Shall be responsible for performing tasks in refinishing, compliance with safety procedures, setting up and breaking down job sites, scaffolding and swing stages and preparing surfaces for refinishing including but not limited to, masking and stripping and cleaning, oxidizing, polishing and scratch removal on various surfaces
.
Class A Workers: Less than 1 Year of Service.
Class B Workers: More than 1 and less than 8 Years of Service.
Class C Workers: More than 8 Years of Service.

Metal Polisher Scope of Work: Polishing, buffing, stripping, coloring, lacquering, spraying, cleaning and maintenance of ornamental and architectural metals, iron, bronze, nickel, aluminum and stainless steel and in mental specialty work, various stone finishes, stone specialty work and any other work pertaining to the finishing of metal, stones, woods, and any window washing/cleaning done in conjunction with this work, using chemicals, solvents, coatings and hand applied lacquer thinner, removing scratches from mirrow finished metals, burnishing of bronze, statuary finishes on exterior and interior surfaces and the use of all tools required to perform such work, including but not limited to polishes, spray equipment and scaffolding.

Swing State Rate: All work on scaffold 4 sections or higher, including any boom lifts and swing stage scaffolds including the rigging and derigging of hanging/suspended swing stage systems and rappelling/bolson chair work, ADD $1.50 per hour.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Painter Local 1020 Commercial

Change # : LCN01-2019fbLoc1020Com

Craft : Drywall Finisher **Effective Date :** 04/17/2019 **Last Posted :** 04/17/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Painter Drywall Finisher	$23.27		$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$37.13	$48.77
Apprentice	**Percent**											
1st-0-1500 hrs	60.00	$13.96	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$27.82	$34.80
2nd- 1501-3000 hrs	75.00	$17.45	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$31.31	$40.04
3rd- 3001-4500 hrs	90.00	$20.94	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$34.80	$45.27

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

1 Journeymen employed to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, CHAMPAIGN, DEFIANCE, HARDIN, LOGAN, MERCER, PAULDING, PUTNAM, SHELBY, VAN WERT, WILLIAMS

Special Jurisdictional Note :

Details :

All surfaces 40 feet or over where material is applied to or labor performed on above the ground level (exterior), floor level (interior), $0.50 per hour shall be applied to the prevailing rate of the classification involved.

Swing stage, Chair, Spiders and Cherry Pickers shall have $0.25 added to the prevailing rate of the classification involved.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Painter Local 1020 Commercial

Change # : LCNO1-2019fbLoc1020Com

Craft : Painter **Effective Date :** 04/17/2019 **Last Posted :** 04/17/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Painter Brush Roll	$21.42		$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$35.28	$45.99
Spray Water Borne Products	$21.42		$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$35.28	$45.99
Sandblaster Pressure Cleaning and Spray of alkyd, epoxy's, and petroleum base products	$22.17		$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$36.03	$47.11
Wallcovering	$22.17		$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$36.03	$47.11
Lead Abatement	$26.32		$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$40.18	$53.34
Apprentice	**Percent**											
1st 0-1500 hrs	60.00	$12.85	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$26.71	$33.14
2nd 1501-3000 hrs	70.00	$14.99	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$28.85	$36.35
3rd 3001-4500 hrs	80.00	$17.14	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$31.00	$39.56
4th 4501-6000 hrs	90.00	$19.28	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$33.14	$42.78

Special Calculation Note : APPRENTICE PAY BASED ON % OF EACH CLASSIFICATION ABOVE PLUS FULL FRINGES.

Ratio :

1 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, CHAMPAIGN, DEFIANCE, HARDIN, LOGAN, MERCER,

PAULDING, PUTNAM, SHELBY, VAN WERT, WILLIAMS

Special Jurisdictional Note :

Details :

Commercial Classification shall be strictly limited to:
All levels of education facilities including dormitories.
Any retail establishments including dealerships but not distribution warehouses.
All Restaurants, bars and clubs.
Medical and dental facilities.
Churches and other religious centers.
Financial Institutions.

Journeymen and apprentices applying Coal Tar products shall have $1.00 per hour added to the prevailing rate of the classification involved.

Journeymen and apprentices working with a spray painter as a rigger, picker, or blow down man shall receive spray painter wages.

Swing stage, Chair, Spiders and Cherry Pickers shall have $.25 added to the prevailing rate of the classification involved.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Painter Local 1020 HevHwy

Change # : LCN01-2019fbLoc1020

Craft : Painter **Effective Date :** 04/17/2019 **Last Posted :** 04/17/2019

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Painter Bridge Class 1	$35.00	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$48.86	$66.36
Bridge Painter, Rigger, Containment Builder, Spot Blaster Class 2	$32.00	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$45.86	$61.86
Equipment Operator/Field Mechanic, Grit Reclamation, Paint Mixer, Traffic Control, Boat Person, Driver Class 3 (0-5 Yrs. Exp.)	$25.00	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$38.86	$51.36
Equipment Operator/Field Mechanic, Grit Reclamation, Paint Mixer, Traffic Control, Boat Person, Driver Class 3 (5 plus Yrs. Exp.)	$28.00	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$41.86	$55.86
Concrete Sealing, Concrete Blasting/Power Washing/Etc. Class 4	$28.00	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$41.86	$55.86
Quality Control/Quality Assurance, Trafiic safety,	$28.00	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$41.86	$55.86

Competent Person Class 5												
Apprentice	**Percent**											
1ST 0-1500 Hrs	60.00	$21.00	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$34.86	$45.36
2ND 1501-3000 Hrs.	70.00	$24.50	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$38.36	$50.61
3RD 3001-4500 Hrs.	80.00	$28.00	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$41.86	$55.86
4TH 4501-6000 Hrs.	90.00	$31.50	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$45.36	$61.11

Special Calculation Note :

Ratio :

1 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, CHAMPAIGN, DEFIANCE, HARDIN, LOGAN, MERCER, PAULDING, PUTNAM, SHELBY, VAN WERT, WILLIAMS

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Painter Local 1020 Industrial

Change # : LCN01-2019fbLoc1020Ind

Craft : Painter **Effective Date :** 04/17/2019 **Last Posted :** 04/17/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Painter Brush Roll	$24.57		$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$38.43	$50.72
Spray Painter Sandblasting Pressure Cleaning Refinery	$25.32		$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$39.18	$51.84
Wall Coverings	$22.17		$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$36.03	$47.11
Lead Abatement (plus .75 premium when blasting)	$26.32		$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$40.18	$53.34
Apprentice	**Percent**											
1st-0-1500 hrs	60.00	$14.74	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$28.60	$35.97
2nd-1501-3000 hrs	70.00	$17.20	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$31.06	$39.66
3rd-3001-4500 hrs	80.00	$19.66	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$33.52	$43.34
4th-4501-6000 hrs	90.00	$22.11	$7.05	$6.48	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$35.97	$47.03

Special Calculation Note : APPRENTIC PAY BASED ON % OF EACH CLASSIFICATION ABOVE PLUS FULL FRINGES.

Ratio :

1 Journeymen employed to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, CHAMPAIGN, DEFIANCE, HARDIN, LOGAN, MERCER,

PAULDING, PUTNAM, SHELBY, VAN WERT, WILLIAMS

Special Jurisdictional Note :

Details :

All surfaces 40 feet or over where material is applied to or labor performed on above the ground level (exterior), floor level (interior), $0.50 per hour shall be applied to the prevailing rate of the classification involved.

Journeymen and apprentices applying Coal Tar products shall have $1.00 per hour added to the prevailing rate of the classification involved.

Journeymen and apprentices working with a spray painter as a rigger, picker, or blow down man shall receive spray painter wages.

Swing stage, Chair, Spiders and Cherry Pickers shall be paid $0.25 added to the prevailing rateof the classification involved.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Plasterer & Drywall Finisher Local 886

Change # : LCN01-2019fbLoc886

Craft : Plasterer **Effective Date :** 07/03/2019 **Last Posted :** 07/03/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Plasterer	$29.11		$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$48.48	$63.03
Drywall	$27.10		$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$46.47	$60.02
Drywall Apprentice												
Drywall 60%	$16.26		$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$35.63	$43.76
Drywall r 55%	$17.62		$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$36.99	$45.80
Drywall 70%	$18.97		$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$38.34	$47.82
Drywall 75%	$20.33		$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$39.70	$49.86
Drywall 80%	$21.68		$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$41.05	$51.89
Drywall 85%	$23.04		$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$42.41	$53.93
Drywall 90%	$24.39		$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$43.76	$55.96
Drywall 95%	$25.75		$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$45.12	$58.00
Drywall Shophand	$18.97		$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$38.34	$47.82
Plasterer Apprentice	**Percent**											
Plasterer	60.00	$17.47	$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$36.84	$45.57
Plasterer	65.00	$18.92	$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$38.29	$47.75
Plasterer	70.00	$20.38	$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$39.75	$49.94
Plasterer	75.00	$21.83	$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$41.20	$52.12
Plasterer	80.00	$23.29	$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$42.66	$54.30
Plasterer	85.00	$24.74	$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$44.11	$56.49
Plasterer	90.00	$26.20	$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$45.57	$58.67

Plasterer	95.00	$27.65	$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$47.02	$60.85
Plasterer Shophand	70.00	$20.38	$8.25	$6.65	$0.30	$0.00	$4.17	$0.00	$0.00	$0.00	$39.75	$49.94

Special Calculation Note : Other is Labor Management

Ratio :

1 Journeymen to 1 Apprentice for 1st Apprentice only
Then 3 Journeymen to 1 Apprentice thereafter

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, DEFIANCE, ERIE, FULTON, HANCOCK, HARDIN, HENRY, HURON, LOGAN, LUCAS, MERCER, OTTAWA, PAULDING, PUTNAM, SANDUSKY, SENECA, VAN WERT, WILLIAMS, WOOD

Special Jurisdictional Note :

Details :

****Improvers receive no fringe benefits for the first 90 days. Then $3.75 Health & Welfare
Workers on Swing Stage will be paid ($.25) per hour above journeyman rate.
Nozzelmen or Operators of the Plastering Browning Gun shall receive ($.75) per hour above journeyman rate.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Plumber Pipefitter Local 776

Change # : LCN01-2019fbLoc776

Craft : Plumber/Pipefitter **Effective Date :** 12/24/2019 **Last Posted :** 12/24/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Plumber Pipefitter	$36.64		$10.40	$7.06	$1.27	$0.00	$6.00	$0.00	$0.00	$0.00	$61.37	$79.69
Apprentice	**Percent**											
1st year	51.82	$18.99	$10.40	$0.00	$1.27	$0.00	$0.00	$0.00	$0.00	$0.00	$30.66	$40.15
2nd year	54.42	$19.94	$10.40	$7.06	$1.27	$0.00	$1.20	$0.00	$0.00	$0.00	$39.87	$49.84
3rd year	59.58	$21.83	$10.40	$7.06	$1.27	$0.00	$3.00	$0.00	$0.00	$0.00	$43.56	$54.48
4th year	71.32	$26.13	$10.40	$7.06	$1.27	$0.00	$3.00	$0.00	$0.00	$0.00	$47.86	$60.93
5th year	81.37	$29.81	$10.40	$7.06	$1.27	$0.00	$3.00	$0.00	$0.00	$0.00	$51.54	$66.45

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

2 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, HARDIN, LOGAN, MERCER, SHELBY, VAN WERT

Special Jurisdictional Note :

Details :

$0.14 under "Other" is Labor Management Corporation Committee.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Roofer Local 75

Change # : LCN01-2019fbLoc75

Craft : Roofer **Effective Date :** 05/01/2019 **Last Posted :** 05/01/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Roofer	$24.38		$7.98	$8.18	$0.65	$0.00	$0.00	$0.80	$0.00	$0.00	$41.99	$54.18
Slate and Tile	$24.60		$7.98	$8.18	$0.65	$0.00	$0.00	$0.80	$0.00	$0.00	$42.21	$54.51
Apprentice	**Percent**											
1st term 1000 hrs	50.00	$12.19	$2.50	$0.50	$0.65	$0.00	$0.00	$0.80	$0.00	$0.00	$16.64	$22.73
2nd term 1000 hrs	55.00	$13.41	$7.98	$1.23	$0.65	$0.00	$0.00	$0.80	$0.00	$0.00	$24.07	$30.77
3rd term 1000 hrs	60.00	$14.63	$7.98	$2.05	$0.65	$0.00	$0.00	$0.80	$0.00	$0.00	$26.11	$33.42
4th term 1000 hrs	70.00	$17.07	$7.98	$2.86	$0.65	$0.00	$0.00	$0.80	$0.00	$0.00	$29.36	$37.89
5th term 1000 hrs	80.00	$19.50	$7.98	$3.68	$0.65	$0.00	$0.00	$0.80	$0.00	$0.00	$32.61	$42.37
Tradesman	79.00	$19.26	$5.00	$1.47	$0.65	$0.00	$0.00	$0.80	$0.00	$0.00	$27.18	$36.81

Special Calculation Note : Other is for National Roofing Industry Pension Plan.

Ratio :

3 Journeymen to 2 Apprentices

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, CLARK, CLINTON, DARKE, GREENE, MERCER, MIAMI, MONTGOMERY, PREBLE, SHELBY, VAN WERT

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Sheet Metal Local 24 (Dayton)

Change # : LCR02-2019fbLoc24(Day)

Craft : Sheet Metal Worker **Effective Date :** 06/19/2019 **Last Posted :** 06/19/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Sheet Metal Worker	$27.72		$8.52	$14.46	$0.85	$0.00	$0.00	$0.00	$0.00	$0.00	$51.55	$65.41
Apprentice	**Percent**											
Apprentice												
5th Year B	80.00	$22.18	$8.26	$11.56	$0.85	$0.00	$0.00	$0.00	$0.00	$0.00	$42.85	$53.93
5th Year A	75.00	$20.79	$8.20	$10.85	$0.85	$0.00	$0.00	$0.00	$0.00	$0.00	$40.69	$51.09
4th Year B	70.00	$19.40	$8.13	$10.13	$0.85	$0.00	$0.00	$0.00	$0.00	$0.00	$38.51	$48.22
4th Year A	65.00	$18.02	$8.07	$9.40	$0.85	$0.00	$0.00	$0.00	$0.00	$0.00	$36.34	$45.35
3rd year B	60.00	$16.63	$8.01	$8.68	$0.85	$0.00	$0.00	$0.00	$0.00	$0.00	$34.17	$42.49
3rd Year A	55.00	$15.25	$7.94	$7.95	$0.85	$0.00	$0.00	$0.00	$0.00	$0.00	$31.99	$39.61
2 Year B	53.78	$14.91	$7.90	$7.02	$0.85	$0.00	$0.00	$0.00	$0.00	$0.00	$30.68	$38.13
2 Year A	52.69	$14.61	$7.88	$6.49	$0.85	$0.00	$0.00	$0.00	$0.00	$0.00	$29.83	$37.13
Probationary 1 Year	51.13	$14.17	$7.85	$5.87	$0.85	$0.00	$0.00	$0.00	$0.00	$0.00	$28.74	$35.83

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

1 Journeyman to 1 Apprentice then,
1 Apprentice for every 2 Journeymen thereafter

Jurisdiction (* denotes special jurisdictional note) :
ALLEN, AUGLAIZE, BUTLER, CHAMPAIGN, CLARK, CLINTON, DARKE, GREENE, HARDIN, LOGAN, MERCER, MIAMI, MONTGOMERY, PREBLE, SHELBY, VAN WERT, WARREN, WYANDOT

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Sprinkler Fitter Local 669

Change # : LCN02-2019fbLoc669

Craft : Sprinkler Fitter **Effective Date :** 01/22/2020 **Last Posted :** 01/22/2020

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Sprinkler Fitter	$39.07		$10.23	$6.80	$0.52	$0.00	$5.12	$0.10	$0.00	$0.00	$61.84	$81.37
Apprentice Indentured after April 1, 2013	**Percent**											
ClLASS 1	45.00	$17.58	$7.75	$0.00	$0.52	$0.00	$0.00	$0.10	$0.00	$0.00	$25.95	$34.74
CLASS 2	50.00	$19.53	$7.75	$0.00	$0.52	$0.00	$0.00	$0.10	$0.00	$0.00	$27.91	$37.67
CLASS 3	55.00	$21.49	$10.23	$6.80	$0.52	$0.00	$0.65	$0.10	$0.00	$0.00	$39.79	$50.53
CLASS 4	60.00	$23.44	$10.23	$6.80	$0.52	$0.00	$0.65	$0.10	$0.00	$0.00	$41.74	$53.46
CLASS 5	65.00	$25.40	$10.23	$6.80	$0.52	$0.00	$0.90	$0.10	$0.00	$0.00	$43.95	$56.64
CLASS 6	70.00	$27.35	$10.23	$6.80	$0.52	$0.00	$0.90	$0.10	$0.00	$0.00	$45.90	$59.57
CLASS 7	75.00	$29.30	$10.23	$6.80	$0.52	$0.00	$0.90	$0.10	$0.00	$0.00	$47.85	$62.50
CLASS 8	80.00	$31.26	$10.23	$6.80	$0.52	$0.00	$0.90	$0.10	$0.00	$0.00	$49.81	$65.43
CLASS 9	85.00	$33.21	$10.23	$6.80	$0.52	$0.00	$0.90	$0.10	$0.00	$0.00	$51.76	$68.36
CLASS 10	90.00	$35.16	$10.23	$6.80	$0.52	$0.00	$0.90	$0.10	$0.00	$0.00	$53.71	$71.29

Special Calculation Note : $0.10 for Other is National Fire Sprinkler Association

Ratio :

1 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAWRENCE,

LICKING, LOGAN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

Sprinkler Fitter work shall consist of the installation,dismantling,maintenance,repairs,adjustments,and corrections of all fire protection and fire control systems including the unloading,handling by hand,power equipment and installation of all piping or tubing,appurtenances and equipment pertaining thereto,including both overhead and underground water mains,fire hydrants and hydrant mains,standpipes and hose connections to sprinkler systems used in connection with sprinkler and alarm systems. Also all tanks and pumps connected thereto,also included shall be CO-2 and Cardox Systems, Dry Chemical Systems,Foam Systems and all other fire protection systems.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Truck Driver Bldg & HevHwy Class 1
Locals 20,40,92,92b,100,175,284,438,377,637,908,957

Change # : OCRO1-2019fbBldgHevHwy

Craft : Truck Driver **Effective Date :** 09/11/2019 **Last Posted :** 09/11/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Truck Driver CLASS 1 4 wheel service, dump, and batch trucks, Oil Distributor - Asphalt Distributor-Tandems	$28.04		$7.00	$7.90	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$43.14	$57.16
Apprentice	**Percent**											
First 6 months	80.00	$22.43	$7.00	$7.90	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$37.53	$48.75
7-12 months	85.00	$23.83	$7.00	$7.90	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$38.93	$50.85
13-18 months	90.00	$25.24	$7.00	$7.90	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$40.34	$52.95
19-24 months	95.00	$26.64	$7.00	$7.90	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$41.74	$55.06
25-30 months	100.00	$28.04	$7.00	$7.90	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$43.14	$57.16

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, DARKE,

DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

** Asphalt - Oil spray bar man when operating from cab shall receive $0.20 cents per hour above their Basic Hourly Rate.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Truck Driver Bldg & HevHwy Class 2
Locals 20,40,92,92b,100,175,284,438,377,637,908,957

Change # : LCRO1-2019-fbBldgHevHwy

Craft : Truck Driver **Effective Date :** 10/16/2019 **Last Posted :** 10/16/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Truck Driver CLASS 2 Tractor Trailer-Semi Tractor Trucks-Pole Trailers-Ready Mix Trucks-Fuel Trucks-Asphalt-Oil Spray bar men- 5 Axle & Over - Belly Dumps-End Dumps-Articulated Dump Trucks- Low boys-Heavy duty Equipment(irrespective of load carried) when used exclusively for transportation-Truck Mechanics (when needed)	$28.46		$7.00	$7.90	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$43.56	$57.79
Apprentice	**Percent**											
First 6 months	80.00	$22.77	$7.00	$7.90	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$37.87	$49.25
7-12 months	85.00	$24.19	$7.00	$7.90	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$39.29	$51.39
13-18 months	90.00	$25.61	$7.00	$7.90	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$40.71	$53.52
19-24 months	95.00	$27.04	$7.00	$7.90	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$42.14	$55.66
25-30 months	100.00	$28.46	$7.00	$7.90	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$43.56	$57.79

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD,

FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

** Asphalt - Oil spray bar man when operating from cab shall receive $0.20 cents per hour above their Basic Hourly Rate.

EXHIBIT 2

ELECTRONIC DOCUMENT RELEASE FORM

M E M O R A N D U M

To: _____

Subject: City of Van Wert, Ohio
Franklin Street & Industrial Drive Pump Station
Renovations
Electronic Document Release
AutoCAD File for Base Drawing
261-7520.001

From: Katie Wambo, P.E. Date: _____

In reference to your request for electronic CAD files for the project, we will provide the requested base drawing electronic file upon your signature below indicating agreement with our electronic document release policy.

These electronic files are provided to you for your convenience. Because electronic files can deteriorate or be damaged or be modified inadvertently or information from the electronic documents may be presented to you on your system differently than the original because of your software or system setup, these files may not be accurate. Any conclusion or information obtained or derived from such electronic files will be at your sole risk.

Information contained in the electronic documents is for information and reference in connection with this project only. The information is not intended or represented to be suitable for reuse on extensions of the original project or on any other project.

You should perform an acceptance test of the electronic documents immediately and inform us of any problems with the electronic documents. Jones & Henry will not be responsible for providing additional copies of these electronic files to you after 60 days from the date the documents are provided to you.

Additional conditions relative to Use of Documents may be in the Agreement between Jones & Henry and our client and should be reviewed before you attempt to use the documents.

_____ accepts the conditions of the above statement.
(FIRM NAME)

Authorized Signature

_____ _____
DATE

c: Project Distribution via posting to Dropbox

SECTION 01010
DEFINITION OF CONTRACT ITEMS

PART 1 GENERAL

0.01 FOREWORD

A. This Section describes the various Contract Items listed in the Bid.

0.02 WORK INCLUDED

A. Under each Item the Contractor shall furnish all labor, materials, tools, plant equipment, supplies, maintenance of equipment, heating, lighting and power, insurance and bonds, coordination, and all Work and in accordance with the Specifications Parts A, B, and Divisions 1 through 16 of Part C and necessary to complete the Work in accordance with the obvious or expressed intent of the Contract Documents.

0.03 WORKMANSHIP AND MATERIALS

A. The quality of workmanship and materials entering into any and all of the Items and the Work included shall conform to pertinent sections, paragraphs, sentences, and clauses, both directly and indirectly applicable thereto, contained in the Contract Documents, whether or not direct reference to such occurs under each Item in this Section.

0.04 PAYMENT

A. The lump sum and unit prices stated in the Bid shall be payment in full for the completion of all Work specified and described or required to be included in the Contract, complete, and ready for use.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

PART 4 SPECIAL PROVISIONS

Not used.

ITEM 1
MOBILIZATION AND DEMOBILIZATION

1.01 DESCRIPTION

A. This Item is intended to pay non-recurring cost to the Contractor not recovered under other pay Items of the Contract.

B. This Item shall include, but not be limited to, the cost for moving equipment in and out, performance and payment bonds, insurance, permits, utility connection cost, and other expenses associated with preparation for construction in accordance with the requirements of the Contract Documents.

C. This item in intended to be in accordance with the Supplemental Conditions 15.01A.

1.02 WORK NOT INCLUDED

A. Any Work specifically included under other Bid Items.

1.03 DEFINITION OF ITEM

A. Item 1 - Mobilization and Demobilization.

1.04 MEASUREMENT

A. The lump sum stated in the Bid shall be full compensation for all Work required under Item 1.

B. The Contractor is reminded of the requirements of Supplemental Conditions Section 15.01.A regarding Mobilization and Demobilization costs as a percentage of the total project cost.

1.05 PAYMENT

Payment shall be in accordance with Supplemental Conditions SC 15.01A The Engineer may reduce the amount to be paid under Item 1 if the percentage requested is not represented by the actual amount performed.

ITEM 2
BYPASS PUMPING

2.01 DESCRIPTION

A. Under this Item, the Contractor shall include materials, equipment and labor required to maintain sanitary sewer service during periods when the existing pump stations or new equipment are not in service as needed to complete the scope of work identified for the

Contractor in the Contract Documents including; all pumping equipment, piping, accessories, maintenance and controls.

B. This item shall include the cost of mobilizing and demobilizing bypass pumping equipment to the site.

2.02 WORK NOT INCLUDED

A. Bypass pumping necessary to permit cleaning and television of sewers is included under other Items.

2.03 DEFINITION OF ITEM

A. Item 2a - Bypass Pumping – Franklin Street Site.

B. Item 2b - Bypass Pumping – Industrial Drive Site.

2.04 MEASUREMENT & PAYMENT

A. The quantities to be paid for under Item 2a and 2b shall be measured per week that the bypass pumping equipment is on site and functioning. No payment will be paid for periods when the equipment is on site, but not functional. A week shall be defined as 7 working days.

B. Payment for periods less than 7-days shall be measured as a percentage of a week.

ITEM 3
STORM WATER POLLUTION PREVENTION

3.01 DESCRIPTION

A. This Item shall include all Work specified in the SWPPP including preparation of a Storm Water Pollution Prevention Plan, installation, maintenance, and removal of all Storm Water Pollution Prevention measures.

B. The weekly inspection and reporting of all Storm Water Pollution Prevention measures shall be included under this item.

3.02 WORK NOT INCLUDED

Not used.

3.03 DEFINITION OF ITEM

A. Item 3 - Includes Storm Water Pollution Prevention.

3.04 MEASUREMENT & PAYMENT

A. The lump sum stated in the Bid shall be full compensation for all Work required under Item 3.

B. Payment shall be made in the amount of 20% of the lump sum Bid price for Item 3 for the first monthly estimate and 5% for each monthly estimate thereafter until the lump sum Bid amount for Item 3 has been paid.

C. The Engineer may reduce the amount to be paid under Item 3 if the percentage requested is not represented by the actual amount performed.

ITEM 4
SANITARY SEWER PUMP STATION RENOVATION
INCLUDING ACCESSORIES AND APPURTENANCES

4.01 DESCRIPTION

A. This Item includes all work shown on the Drawings and in accordance with the Specifications, Divisions 1 through 16 unless identified in other Items. The summary of items listed below is not intended to be an exhaustive list, instead the list is provided to highlight major work components and to differentiate what work is not included in the other Items or Allowances provided.

B. Under this Item, the Contractor shall include materials, equipment, electrical and controls, piping and valves, labor, supervision, coordination, overhead, and profit as specified, shown on the Drawings, or otherwise required to complete and place in operation the renovated pump station wet wells, valve vaults, including all specified accessories, and appurtenances with the expectation of a fully functional project at completion. The Contractor is expected to identify items not included in the price proposals of suppliers, vendors and Allowance Items and include that work in the pricing included under this Items. Any gaps in the scope of work requiring clarification should be submitted to the Engineer for review, prior to submitting a bid.

C. The removal of accumulated debris and sewage from the wet well shall be included under these Items.

D. The provision of new electrical equipment and electrical work as required on the customer side of the electric meter is included in these Items. Electrical work includes wiring, terminations, specified control panels and mounting hardware and supports.

E. Under this Item, the Contractor shall abandon the existing Franklin Street Dry Well as shown on the Drawings and according to the relevant sections of the Specifications. The removal and salvaging of existing equipment as shown on the Drawings or Specified shall be included under this Item. This Item shall include above grade and below grade removals. All parts, pipe fittings, materials and accessories required to abandon the

existing pump station shall be included under this Item. The backfilling of the existing pump station structure as specified is included under this Item.

F. Under this Item, the Contractor shall modify the existing Wet Wells as shown on the Drawings and according to the relevant sections of the Specifications. The removal and salvaging of existing equipment as shown on the Drawings or Specified shall be included under this Item. This Item shall include above grade and below grade removals. All parts, pipe fittings, materials and accessories required to abandon the existing pump station shall be included under this Item.

G. This Item includes all excavation of materials not included for payment under other Items, including hauling excess spoil material from Site and the placement and compaction of backfill in excavated areas.

H. This Item includes the construction of shoring and earth retaining systems as required for the excavations included in the Work.

I. This item includes the maintenance of trenches and excavations including dewatering and others measures to maintain open excavations necessary for the work.

J. The furnishing and placing of special backfill in areas specified under Section 02200 is included under this Item.

K. The installation of specified protective coatings for concrete surfaces exposed to sanitary sewage is included under this Item. This includes are required preparation, application, curing and incidental work necessary to install the specified coatings`.

L. These Items shall include all Work to install new or reconstructed sanitary sewers, manholes and force mains, including but not limited to the following: excavation; hauling excess spoil material from Site; backfill; compaction; bedding; pipe materials; fittings; maintenance of trenches; connections to existing sewers or force mains; and related Work and materials such as testing as specified in conformance with relevant Sections of the Specifications.

M. The removal and abandonment of sewers and force mains, including existing fittings, valves, backfill, bedding, structures, concrete encasements and other associated appurtenances shall be included under these Items.

N. These Items shall include all pipe fittings, accessories and appurtenances not included in other pay items. Fittings, including those not shown on the plans required to avoid existing utilities shall be included under these Items incidental to the work.

O. The provision of new precast structure tops as required is included in this Item.

P. The provision and installation of the prepackaged pump station is included in this item.

Q. The temporary support of utilities as required to complete the Work, shall be included under these Items. All repairs to existing utilities damaged, as a result of construction, are included under these Items.

R. Restoration of landscape surface improvements including seeding, mulching, and fertilizing all disturbed lawn areas shall be included under this Item.

4.02 DEFINITION OF ITEM

A. Item 4a – Franklin Street Pump Station Renovation Including Accessories and Appurtenances.

B. Item 4b – Industrial Drive Pump Station Renovation Including Accessories and Appurtenances.

4.03 MEASUREMENT & PAYMENT

A. The quantities to be paid for under Items 4a and 4b shall be lump sum for the identified scope of work in accordance with the Specifications and Drawings.

ITEM 5
CLEANING AND TELEVISING SEWER MAINS

5.01 DESCRIPTION

A. Under these Items, the Contractor shall furnish and perform all work necessary to clean and televise sewers, in conformance with relevant Sections of the Specifications.

B. These Items shall include the removal of debris in the sewer, any protruding obstructions or roots necessary to permit the television inspection work in sewer mains.

C. These Items shall include the disposal of debris generated by the cleaning, protruding obstruction and root removal operations.

D. The furnishing and installing any plugs required to control sewer flow during cleaning and testing or any bypass pumping that might be required to prevent the backup of sewage into buildings and residents shall be paid for under these Items. Bypass pumping necessary to permit cleaning and television work is included under this Item.

E. The cleaning of manholes used for bypass pumping operations is included under this item.

5.02 WORK NOT INCLUDED

A. Replacement of damaged surface structures as a result of Contractor’s operations shall be replaced at the Contractor's expense.

B. Maintaining traffic around Contractor's equipment is included under other Items.

C. Television inspection of lateral sewers is included under other Items.

5.03 DEFINITION OF ITEMS

A. Item 5a - Preconstruction Sewer Cleaning and Televising 12-inch Sewers.

B. Item 5b - Post-Construction Sewer Cleaning and Televising 12-inch Sewers.

C. Item 5c - Post-Construction Sewer Cleaning and Televising 6-inch Sewers.

5.04 MEASUREMENT & PAYMENT

A. The quantities to be paid for under the Items 5a, 5b and 5c shall be the linear feet of pipe cleaned and televised for the sewers of the specified size. The footage shall be measured using the Contractor's television equipment reel.

ITEM 6
PROTECTIVE COATING OF CONCRETE STRUCTURES

6.01 DESCRIPTION

A. Under these Items, the Contractor shall provide all labor, equipment, materials required to rehabilitate the existing wet well structures with a new protective coating as scheduled and in conformance with relevant Sections of the Specifications.

6.02 WORK NOT INCLUDED

A. Maintaining traffic around Contractor's equipment is included under other Items.

6.03 DEFINITION OF ITEMS

A. Item 6a- Franklin Street Wet Well Protective Coating.

B. Item 6b – Industrial Drive Wet Well Protective Coating.

6.04 MEASUREMENT & PAYMENT

A. The quantities to be paid for under Items 6a and 6b shall be for each wet well lined with the specified protective coating, as specified or directed by the Engineer.

END OF SECTION

SECTION 01021
ALLOWANCES

PART 1 GENERAL

1.01 SCOPE

A. This Section includes the allowances which are to be furnished by the Contractor per Paragraph GC-11.8. of the General Conditions.

B. The Contractor shall include in the Contract Price all allowances stated in the Contract Documents. These allowances shall cover the net cost of the materials and equipment delivered and unloaded at the Site, and all applicable taxes.

C. The Contractor's handling costs on the Site, labor installation costs, overhead, profit and other expenses contemplated for the original allowance shall be included in the Contract Price and not in the allowance.

D. The Contractor shall cause the Work covered by these allowances to be performed for such amounts and by such persons as the Engineer may direct, but he will not be required to employ persons against whom he makes a reasonable objection.

E. If the cost, when determined, is more than or less than the allowance, the Contract Price shall be adjusted accordingly by Change Order.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

   a. Contractor shall prepare and submit proposals for the Owner to select the items included in allowance.

2. Information for the Record:

   a. Operation and maintenance manuals as may be required for items included in allowance.

   b. Invoices and delivery slips, for items provided under the allowance, shall be submitted to the resident project representative or Engineer.

1.03 PRODUCT HANDLING

A. The Contractor shall provide all labor, material and equipment to ensure the safe delivery, handling and storage of goods until acceptance by Owner and Engineer.

1.04 GUARANTEE

A. Contractor shall provide manufacturer's warranties to the Owner for all goods provided.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 COORDINATION

A. Contractor shall advise Owner and Engineer of, and include in the schedule, the timing of the selection, Shop Drawing review and procurement of the goods or services required in the allowance.

B. Contractor shall be responsible for the coordination, of all allowance item(s) provided, with the remainder of the contract work.

3.02 ERECTION, INSTALLATION AND APPLICATION

A. Contractor shall assemble, install or apply all goods as may be required to complete the requirements of the allowance.

3.03 PROTECTION

A. Contractor shall examine all goods on delivery. All damaged or defective goods shall be returned to the manufacturer for replacement.

PART 4 SPECIAL PROVISIONS

4.01 LIST OF ALLOWANCES

		Allowance Amt
A.	Telemetry Interface and Programming	$5,000.00

1. This allowance item is intended to reimburse the Contractor for costs associated with programming and communication work necessary to connect signals, alarms and equipment status monitored in the RTU Panel.
2. This work will be performed by the Owner's System's Integrator: Dmytryka Jacobs Engineers (DJE), 1101 Research Dr., Toledo, OH 43614, 419-380-4900.
3. A proposal from DJE showing their proposed scope of work is attached herein for the Contractor's reference and for the understanding of Bidders when determining what work is to be included under the Contract. The Contractor shall provide all other work required under the Contract not specifically

included in DJE's quote to provide a complete and operational pump station.

4. An invoice from DJE will be required to be submitted to substantiate payment amounts claimed under this allowance item.

B. Chemical Grout Injection of Pipe Connections $2,000.00

1. This allowance item is intended to reimburse the Contractor for costs associated with chemical grout injection of leaks occurring at pipe connections due to imperfections in the existing structures where new pipe connections are proposed.

2. An invoice for materials and labor expended in the sealing of leaks will be required to be submitted to substantiate payment amounts claimed under this allowance item.

C. All work not specifically defined in an Allowance Item is to be included in the Contractor's (Bidder's) pricing for the work.

END OF SECTION

DMYTRYKA JACOBS ENGINEERS, INC.

1101 Research Drive – Toledo, Ohio 43614

March 6, 2020

Ms. Katie Wambo
Jones & Henry Engineers, Ltd.
3103 Executive Parkway, Suite 300
Toledo, OH 43606

Subject: ***Van Wert, OH Pump Station Replacement***
Programming and Commissioning Services

Dear Ms. Wambo,

This letter is in response to our meeting on January 30, 2020. It represents our proposal for programming and commissioning services for the City of Van Wert, OH Pump Station Replacement project.

DJE will provide the following:

- PLC and HMI programming services to accommodate the changes being made to the Franklin pump station.
- Commissioning of the PLC and HMI programming provided by DJE to verify the status and control of the Franklin pump station.
- Modify the existing drawings for the Franklin pump station RTU enclosure to reflect the changes made.
- Backup copies of the PLC and HMI applications.

DJE will provide services listed above for a lump sum of **$5,000.00 (five thousand dollars and zero cents)**.

If you have any questions or wish to discuss this in more detail, please do not hesitate to contact me.

Very truly yours,

Mark E. Lyons, P.E.
Principal

/cdd

(419) 380-4900 • (800) 764-6624 • Fax (419) 380-4907 • Email dje@djeinc.com

SECTION 01043
COORDINATION AND CONTROL OF THE WORK

PART 1 GENERAL

1.01 SCOPE

A. This section includes coordination and control of the Work.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Information for the Record:

a. Bypass Pumping plan and procedures.

b. Haul routes to and from Site.

c. Plan and procedures for any shut downs and bypass pumping.

d. Coordination drawings shall include, but not be limited to, all process piping including, but not limited to, bill of material, laying length, embedded conduit runs, and embedded plumbing lines.

1.03 LINES AND GRADES

A. All Work under this Contract shall be built in accordance with the lines and grades shown on the Drawings or as altered or modified by authority of the Owner and Engineer.

1.04 EXISTING STRUCTURES SHOWN ON DRAWINGS

A. Where underground and surface structures are shown on the Drawings, the location, depth, and dimensions of such structures are believed to be reasonably correct but are not guaranteed.

B. Such structures are shown for the information of the Contractor, but information so given is not to be construed as a representation that such structures will in all cases be found or encountered just where shown, or that they represent all the structures which may be encountered.

1.05 COOPERATION OF CONTRACTOR

A. The Contractor shall conduct his operations so as to interfere as little as possible with those of the Owner, other contractors, utilities, or any public authority on or near the Work.

B. The Owner reserves the right to perform other Work by contract or otherwise, and to permit other public bodies, public utility companies, and others to do Work on or near the project during progress of the Work. If a conflict arises, the Owner will determine when and how the Work shall proceed.

C. Claims for delay or inconvenience due to operations of such other parties on Work specified, shown on the Drawings, as directed or which can be reasonably expected to be encountered by the nature and location of the Work will not be considered.

D. Operations entailing the use of construction equipment and lights outside the hours or 7:00 am and 5:00 pm or outside the hours allowed for construction by local ordinances or regulations.

E. Closing off clear access to any public alley, street, road, avenue or boulevard without the prior consent of municipal officials and the Engineer is prohibited.

F. Contractor and subcontractors are required under Ohio Revised Code Section 149.53 to Notify the Ohio Historical society and the Ohio Historic Site Preservation Board of archeological discoveries located in the project area and to cooperate with these entities in archeological and historical surveys.

1. State Historical Preservation Phone number 614-298-2000.

1.06 MAINTENANCE OF SANITARY SYSTEM DURING CONSTRUCTION

A. All construction which requires interruption of existing sanitary system flow shall be executed during periods designated by the Owner.

B. Bypassing of untreated sanitary wastewater to any stream or body of water is prohibited.

1.07 PERMANENT PAVEMENT AND FINAL RESTORATION

A. When sewer construction is being done between April 15 and November 1, the final pavement restoration work shall be complete by November 1.

B. Pavement restoration shall include, but not limited to, replacement of pavement, driveways, and sidewalks.

C. The fine grading, topsoil, and seeding operation shall be no further behind the pavement restoration than 2 weeks.

D. If at any time the pavement restoration and the fine grading, topsoil, and seeding operation does not meet the above conditions, no further mainline pipe laying will be permitted until the Contractor is in compliance.

E. In order to comply with the above conditions, the Contractor shall complete the pipeline and all appurtenances including, but not limited to, testing, in order to begin final pavement restoration and the fine grading, topsoil, and seeding operation.

1.08 TEMPORARY PAVEMENT RESTORATION

A. The Contractor shall provide and maintain temporary pavement for all roads in which construction occurs. Temporary pavement shall be in accordance with Section 01565.

1.09 TEMPORARY PARKING FACILITIES

A. Parking spaces for the Contractor's personnel shall be provided and maintained in usable condition by the Contractor at all times. Provisions shall be made so that sediment is not tracked onto paved roadways from the vehicles operated by the Contractor's personnel. The parking areas shall consist of temporary parking areas or new permanent parking areas shown on the Drawings. Temporary parking areas are to be located in the area designated by the Owner and Engineer. At the completion of the project, temporary parking areas shall be removed and the surface restored as specified, shown on the Drawings, as directed or to its original condition.

B. The Contractor's personnel shall not utilize existing permanent parking areas unless specifically noted otherwise on the Drawings.

1.10 TEMPORARY WATER, HEATING, LIGHTING AND POWER

A. The Contractor shall provide all water, heat, lighting, and power required to construct and protect the Work until Final Completion.

B. The source for temporary power shall be from the electric utility or portable power source.

C. The source for temporary water can be from the water utility if available. The Contractor shall furnish all backflow prevention devices, flow meter and appurtenances as may be required by the water utility. Should the water utility impose a charge for furnishing, to the Contractor, the meter or appurtenances the Contractor shall pay all the fees. The Contractor shall pay all charges for the water metered.

1. If a water utility is not available, the Contractor shall be responsible for furnishing water and all cost associated including, but not limited to, procurement, hauling, pumping equipment, and appurtenances.

D. The Contractor shall pay for all significant amounts of electric power utilized by the Contractor in the construction of the facility. All electric power used for such significant uses as pumping groundwater and heating shall be separately metered and paid for by the Contractor.

E. The installation for electric power shall meet the requirements of federal, state, and local authorities and regulatory agencies.

1.11 DISPOSAL OF DEBRIS

A. All debris resulting from construction operations, i.e., packaging, waste materials, damaged equipment, etc., shall be trucked from the Site by the Contractor and disposed of at spoil sites.

B. The Contractor shall police the hauling of debris to ensure that all spillage from haul trucks is promptly and completely removed from public or private rights-of-way.

C. All debris shall be disposed of in accordance with federal, state, and local laws and regulations.

1.12 CONTROL OF NOISE

A. The Contractor shall eliminate noise to as great an extent as possible at all times. Air compressors shall be equipped with silencers and the exhaust of all gasoline motors and other power equipment shall be provided with mufflers. In the vicinity of hospitals, libraries, and schools, precautions shall be taken to avoid noise and other nuisance, and the Contractor shall require strict observances of all pertinent ordinances and regulations. Any blasting permitted in such locations shall be done with reduced charges.

1.13 SMOKE PREVENTION

A. Strict compliance with all ordinances regulating the production and emission of smoke will be required, and the Contractor shall accept full responsibility for all damage that may occur to property as a result of negligence in providing required control.

1.14 DEBRIS AND DUST CONTROL

A. Contractor shall perform debris and dust control in accordance with Section 01568.

B. The Contractor shall apply water, dust palliative, or both, for the alleviation or prevention of dust nuisance caused by his operations. Dust control operations shall be performed by the Contractor as site conditions dictate or as order by the Owner and Engineer.

C. The Contractor shall utilize mechanical equipment to remove all debris from all streets, drives and walks to the satisfaction of the Owner and Engineer. Cleaning shall be performed at a minimum of daily and as directed by the Owner and Engineer.

D. The cost of the all debris and dust control methods shall be the responsibility of the Contractor.

1.15 SANITARY REGULATIONS

A. The Contractor shall provide all necessary housing accommodations for the workers for changing clothes and for protection during inclement weather. Toilet accommodations shall also be maintained for the use of the employees on the Work. The accommodations shall be in approved locations, properly screened from public observance and shall be maintained in a strictly sanitary manner. The Contractor shall obey and enforce all other sanitary regulations and orders; shall take precautions against infectious diseases and the spread of same; and shall maintain at all times

satisfactory sanitary conditions around all shanties, tool and supply houses, and on all other parts of the Work.

1.16 RESERVED

1.17 EMERGENCY MAINTENANCE SUPERVISOR

A. The Contractor shall submit to the Engineer the names, addresses, and telephone numbers of two employees responsible for performing emergency maintenance and repairs when the Contractor is not working. These employees shall be designated in writing by the Contractor to act as his representative and shall have full authority to act on his behalf as specified in GC 6.2 of the General Conditions.

B. Contractor shall post at job Site, in a conspicuous location, the emergency numbers for the project.

C. Contractor shall be responsible for contacting the local fire, police, and emergency response personnel and organizations in advance of the Work. The Contractor shall be responsible for the coordination and compliance with emergency response plans, whether developed by the governing agency, laws, or the Contractor for the project.

D. At least one of the designated employees shall be available for a telephone call any time an emergency arises.

1.18 PUBLIC SERVICE STRUCTURES

A. Public service structures shall be understood to include all poles, tracks, pipes, wires, conduits, house-service connections, vaults, manholes, and other appurtenances, whether owned or controlled by the Owner or other public bodies or by privately-owned corporations, used to supply the public with transportation, heating, electric, telephone, gas, water, sewer, or other services.

B. At least a week in advance of breaking ground, the Contractor shall notify the registered underground protection service, all public bodies, and other owners of such facilities of the proposed location of his operations, advising them that their property may be affected and that such measures as they may deem necessary should be promptly taken to protect, adjust, remove, or build them.

C. In developed residential and commercial areas, the Contractor shall assume each building and dwelling has water and sewer services and that they shall be protected and repaired as needed as part of the pipeline installation. No additional payment will be made for Work associated with supporting or repairs of such services.

D. Three conditions which may be encountered will be dealt with as follows:

1. Structures which are adjacent to but not included within the limits of an excavation required for performance of the Work shall be protected, supported, and maintained in service by the Contractor at his expense.

2. Structures within the limits of the Work which can be satisfactorily supported and maintained in service and which do not require removal and rebuilding in the judgment of the Engineer shall be thus supported by the Contractor at his expense, including cost of repair of damage incident to his operations.

    a. Supports for water and gas mains, sewers, conduits, and similar structures shall be constructed of timber or other acceptable materials; shall be supported from undisturbed foundations, and shall be sufficiently substantial to ensure against settlement when pipe trenches or other excavations are backfilled. In all cases where permits or inspection fees are required by utilities in connection with changes to or temporary support of their conduits, the Contractor shall secure such permits and pay all permit and inspection fees.

    b. The Contractor shall assume full responsibility for maintaining all public service structures in service and shall support and protect, or remove and rebuild them at his own expense. Such services shall not be interrupted without permission of the owner of the public service structure.

3. In case relocation of pipelines or other utility structures is required because of direct interference, as determined jointly by the Owner, Engineer, and Contractor, with the installation of the Work, the Contractor shall notify the Owners of the utility structure involved.

    a. The Contractor will not be reimbursed for the cost of the relocation if the interference is shown on the Drawings, described in the Specifications, apparent on visual inspection, or specifically included in the Work to be performed by the Contractor.

    b. The Contractor will not be paid for time lost because of such direct interference. Where it is the policy of any utility owner to perform such Work with his own forces, the Contractor shall cooperate to the fullest extent with such utility owner.

1.19 UNAUTHORIZED OR PROHIBITED WORK

A. Work done beyond the lines shown on the Drawings or ordered, Work done without required inspection, except as herein provided, or any extra work done without authority will be considered as unauthorized and will not be paid for under the provisions of the Contract. Work so done may be ordered removed at the Contractor's expense. Work done without lines and grades being given shall be considered as unauthorized and subject to rejection.

B. Disposing of excess or unsuitable materials, including but not limited to excavated material, demolition debris, clearing and grubbing debris, in wetlands or flood plains.

C. Locating stock piles in environmentally sensitive areas.

D. Pumping of sediment-laden water from trenches or excavations directly into any surface waters, stream, wetlands, or sewers. Pumped water shall b properly filtered and desilted prior to discharge.

E. Open burning without a permit.

F. Discharging injurious silica dust concentrations into the atmosphere within 200 feet of any residential or commercial, or public o private places of human occupancy.

1.20 DRAINING OF TANKS AND PIPELINES

A. Unless otherwise indicated, tanks, pipelines, and other similar structures that are to be removed from service, to complete the Work will be initially drained by the Owner.

B. Draining will be by gravity or by a permanently installed pump, if available.

C. After the tank has been drained by the Owner to the lowest level possible with existing means for drainage, the Contractor shall remove and dispose of remaining liquid and accumulated solids, as required to complete the Work.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

PART 4 SPECIAL PROVISIONS

4.01 MAINTAINING FLOW IN EXISTING SEWERS

A. Flow in existing storm, sanitary and private sewers shall be maintained at all times during construction of this project. The Contractor shall furnish and install all necessary temporary facilities required to maintain the flow in existing sewers including bulkheads, plugs, stop planks, flumes, coffer dams, pumping equipment, valves, etc.

B. Bypass Pumping Requirements

1. The Contractor shall provide a minimum of two pumps each with the firm pumping capacity outlined herein.
2. The pumps shall be operated by a power source supplied by the Contractor.
3. The pumps shall be provided with a level monitoring system with automatic dialing capabilities to notify the Contractor of pump failure or high levels in the bypass manhole.
4. The Contractor should take note of the allowable surcharge levels when evaluating bypass pumping units to ensure priming and snore capabilities of the pumping equipment are appropriate for this application.
5. Franklin Street Pump Station

a. Performance Requirements

1) The Contractor is expected to use the existing 8-inch nominal diameter force main for conveying wastewater around the work area as specified in the sequence of construction. A temporary tee connection will be installed South of the pump station for the bypass pumping as indicated on the drawings. The C-factor for the existing force main is believed to be roughly 115 as derived from field testing.

2) The 8-inch force main high point is believed to be 763.55 (same datum as design plans).

3) The 8-inch force main is approximately 2,915-feet in length.

4) The bypass pumping system should be designed to meet the following operating conditions with one pump:

1.296 MGD (900 gpm)

5) Manhole 10193 may be surcharged roughly 8-feet above the bottom invert during bypass pumping operations.

b. The Contractor shall assume bypass pumping will be required for a period of not less than 4 weeks total for the project. Costs associated with longer duration bypass pumping resulting from delays beyond the Contractor's control shall be negotiated as a change order.

c. The Contractor shall submit a bypass pumping plan for review by the Engineer. The bypass pumping plan shall include any details required to connect to the existing force main as well as measures required to block flow in gravity sewers and piping proposed for discharging flow into existing manholes. The plan shall show the proposed locations for pumping equipment. The bypass pumping plan provided shall be considered the minimum requirements.

d. The Contractor is expected to connect to the existing 8-inch force main as shown on the plans to bypass flow from the existing gravity sewers to the existing wet well. The Contractor shall coordinate the connection with the Owner. Following the completion of the work, the bypass connection shall be dismantled and removed.

e. All bypass pumping discharge piping shall be provided with check valves and air release structures as needed.

f. The Contractor is expected to provide bypass pumping equipment will level sensing and autodialer capabilities to alert 24-hour contacts of trouble with the bypass pumping equipment.

6. Industrial Drive Pump Station

a. Performance Requirements

1) The Contractor is expected to use temporary piping for conveying wastewater around the work area as specified in the sequence of construction. Bypass pumps should be set up at Manhole 10074 and flow should be conveyed through the temporary piping to Manhole 10037. Manhole 10037 must either be replaced before bypass pumping begins or at the end of the work. A temporary shutdown of the pump station for a maximum of 6-hours is permitted to replace this manhole. It is recommended the contractor complete this work during low flow time coordinated with the Owner.

2) A temporary piping well is to be installed on the existing 6-inch lateral sewer entering the wet well from the east side of Industrial Drive.

3) The bypass pumping system should be designed to meet the following operating conditions with one pump:

   0.504 MGD (350 gpm)

4) Manhole 10074 may be surcharged up to 6-inches above the invert.

b. The Contractor shall assume bypass pumping will be required for a period of not less than 3 weeks total for the project. Costs associated with longer duration bypass pumping resulting from delays beyond the Contractor's control shall be negotiated as a change order.

c. The Contractor shall submit a bypass pumping plan for review by the Engineer. The plan shall show the proposed locations for pumping equipment. The bypass pumping plan provided shall be considered the minimum requirements.

d. All bypass pumping discharge piping shall be provided with check valves and air release structures as needed.

e. The Contractor is expected to provide bypass pumping equipment will level sensing and autodialer capabilities to alert 24-hour contacts of trouble with the bypass pumping equipment.

4.02 WET WEATHER CONDITIONS

A. The sanitary sewer collection system is prone to elevated flow rates and surcharged conditions during wet weather events. The duration of elevated flows and surcharged conditions is dependent upon the nature of weather conditions during the work.

B. The Contractor shall make provisions to suspend the work during periods of elevated flow rates and surcharged conditions. The Owner will not provide temporary pumping measures to lower the level of flow in the sanitary sewer to permit the work to continue during wet weather. The occurrence of elevated wet weather flows and surcharge conditions shall not be justification for a delay claim.

4.03 POTENTIALLY HAZARDOUS ENVIRONMENT

A. The environment in portions of the Site is rated as Class I Division 1 or 2 or some areas of the Site are designated as permitted Confined Spaces. As a minimum, whenever the Contractor is performing Work in these areas, the Contractor shall provide Factory Mutual- and UL-approved continuous monitoring of the atmosphere for the presence of hydrogen sulfides, of low oxygen concentration, and of explosive gases (both lighter and heavier than air). The Contractor shall evacuate all personnel from the areas whenever the detection system registers hydrogen sulfide levels of greater than 20 ppm, oxygen levels less than 19.5% or combustible gas levels of greater than 10% of the LEL. In addition, whenever the Contractor is using tools producing open flames or sparks, such as cutting torches, saws, and grinders, the Contractor shall provide for the forced air exhaust ducted from the immediate area of the Work.

4.04 REQUIRED SAFETY DOCUMENTATION TO BE SUBMITTED

A. On all projects that require the Contractor's or subcontractor's personnel to occupy permitted confined spaces and/or hazardous atmospheres on the Site, the Contractor shall submit to the Owner, a written proposed safety program. The safety program shall comply with all Federal, State, and local requirements. If the Owner has a safety plan that is more stringent than the Federal and State requirements, it will be made available to the Contractor for review. The submittal of the proposed safety program to the Owner shall be made well in advance of the start of construction at the Site. The submittal shall include a written Safety Management Plan including Confined Space Entry procedures. The Contractor shall be responsible to maintain documentation that anyone employed by the Contractor, subcontractors, or suppliers of any tier to the Contractor occupying such hazardous locations has received the appropriate confined space entry training and other applicable training. The Contractor is also responsible to maintain completed confined space entry permits.

4.05 SEQUENCE OF CONSTRUCTION

A. The following is a suggested sequence of construction to complete the pump station improvements while maintaining reliable pumping capabilities.

B. The Contractor may modify this sequence but will still be responsible for meeting the contract complete dates outline in the Contract.

C. Franklin Street Sequence of Construction

1. Excavate the existing force main South of the existing pump station, at the location shown on the plans. Shut down the pump station temporarily to install a temporary tee connection for the bypass pumps. Also install a plug on the north branch of the tee to stop flow from the pump station during bypass.

2. Install 12" plug at existing wet well.

3. Deploy bypass pumping equipment at the temporary tee location, pumping from Manhole 10193
4. Coordinate with AEP to electric disconnected.
5. Excavate for the new pump station wet well top, valve chamber, bypass chamber and manhole.
6. Construct the wet well top, valve chamber, bypass chamber and manhole, complete with all appurtenances.
7. Construct modifications to the bypass manhole.
8. Install new force main from the new valve chamber to the existing force main.
9. Coordinate with AEP to have new electric connected.
10. Install new Electrical Control Panel
11. Reinstall RTU Panel.
12. Install all new cables and conduit at the new pump station and terminate for connection to the new Control Panel and RTU Panel to be reused from the existing station.
13. Shut down the pump station temporarily to remove 8-inch plug from bypass pumping location and cap the 8” tee with an 8” MJ plug and 12”plugs on existing server.
14. Startup and Testing of new pump station.
15. Demobilize bypass pumping equipment once the new pump station is operable. If additional bypass pumping is needed following startup, the wet well bypass suction pipe and bypass manhole may be used.
16. Remove specified equipment for salvage from the dry well.
17. Remove structural components of dry well structure
18. Fill the dry well with CDF to the indicated elevation to complete abandonment.
19. Complete final site work and restoration.

D. Industrial Drive Sequence of Construction

1. Replace Manhole 10037 before bypass pumping can begin (or at the end of the work).
2. Coordinate with AEP to have electric disconnected.
3. Plug both force main entry points on Manhole 10037
4. Deploy bypass pumping equipment at the designated locations on the plans.
5. Remove specified equipment for salvage from the wet well.
6. Excavate for the new pump station wet well top.

7. Construct the wet well top and prepackage pump station, complete with all appurtenances.
8. Complete all electrical and control work.
9. Coordinate with AEP to have new electric connected.
10. Install new force main to the newly constructed Manhole 10037.
11. Startup and Testing of new pump station.
12. Connect force mains to Manhole 10037 and remove plugs.
13. Demobilize bypass pumping equipment once the new pump station is operable.
14. Complete final site work and restoration.

4.06 SUBGRADE INVESTIGATION

A. The Contractor shall be aware that a detailed subgrade investigation has not been made as work will be performed in previously disturbed areas where subgrade conditions are expected to differ from native materials and conditions.

B. The Contractor is expected to make the necessary investigations sufficient for the Contractor to submit a bid for the Work.

4.07 ELECTRIC SERVICE UPGRADES

A. The existing 230V electrical services at both Industrial Drive and Franklin Street Pump Stations are being upgraded to 460V.

B. There will be no costs to the Contractor from AEP for service upgrades. The cost for improvements to AEP's equipment on the utility side of the meter will be split 60/40 between the City and AEP. A disconnection and reconnection fee of $153 will be charged by AEP and paid by the City. The cost for overhead electrical obstruction coordination is not considered part of the service upgrade and costs from AEP to the Contractor may be required.

C. The Contractor is responsible for those work items noted on the plans and as required to ensure a complete and operating pump station is provided.

D. The Contractor is expected to coordinate the work with AEP to prevent delays and excessive bypass pumping costs as might be incurred due to a delay in the provision of the new electrical service.

E. AEP has provided the following Work Order Numbers:

1. Franklin Street
   a. Disconnection: 074 179 906
   b. Reconnection: 070 622 472
2. Industrial Drive

a. Disconnection: 077 482 397

b. Reconnection: 074 928 194

4.08 FRANKLIN STREET COMMUNICATION (RTU) PANEL TO BE REUSED.

A. The Contractor shall carefully remove and disconnect the Communication (RTU) Panel at Franklin Street.

B. The removed panel shall be provided to the Owner for Storage.

C. When ready the Contractor shall mount the reused panel on the equipment rack.

D. Electrical terminations within the panel for power and cabling shall be performed by the Contractor.

E. Programming of the PLC and pump controls shall be by DJE through the provided Allowance Item.

F. The Contractor is expected to coordinate this work with DJE.

4.09 OVERHEAD PRIMARY ELECTRIC

A. The Contractor shall be aware that overhead primary electric exists at both sites.

B. The Contractor shall visit the site prior to providing a bid for the work to ensure overhead obstructions and the coordination of such are included in the pricing for the work.

C. The Contractor is expected to provide precast concrete structures with weights consistent with hoisting / lifting machinery that can perform the Work and achieve clearances from overhead obstructions as required by Utility Owners.

END OF SECTION

SECTION 01090
REFERENCE STANDARDS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes reference standards.

1.02 DESIGNATION OF ASSOCIATIONS, INSTITUTIONS, SOCIETIES AND STANDARDS

A. Whenever in these Specifications reference is made to Associations, Institutions, Societies, or Standards, they will be designated as follows:

AA	-	Aluminum Association
AAMA	-	Architectural Aluminum Manufacturers Association
AASHTO	-	American Association of State Highway and Transportation Officials
ACI	-	American Concrete Institute
ADAAG	-	Americans with Disabilities Act Accessibility Guidelines
AFBMA	-	Anti-Friction Bearing Manufacturers Association
AFI	-	Air Filter Institute
AGA	-	American Gas Association
AGMA	-	American Gear Manufacturers Association
AIHA	-	American Industrial Hygiene Association
AISC	-	American Institute of Steel Construction
AISI	-	American Iron & Steel Institute
AITC	-	American Institute of Timber Construction
AMCA	-	Air Moving and Conditioning Association
ANSI	-	American National Standards Institute
API	-	American Petroleum Institute
ARI	-	Air Conditioning and Refrigeration Institute
ASA	-	American Standards Association
ASHRAE	-	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	-	American Society of Mechanical Engineers
ASTM	-	American Society for Testing Materials
AWPB	-	American Wood Preservers Bureau
AWS	-	American Welding Society
AWWA	-	American Water Works Association
BLS	-	Bureau of Labor Standards
CISPI	-	Cast Iron Soil Pipe Institute
FM	-	Factory Mutual
FS	-	Federal Specifications
IBR	-	Institute of Boiler and Radiator Manufacturers

IEEE	-	Institute of Electrical and Electronic Engineers
INETA	-	International Electrical Testing Association
ISA	-	Instrument Society of America
JIC	-	Joint Industrial Council
ODOT	-	Ohio Department of Transportation
NBS	-	National Bureau of Standards
NEC	-	National Electrical Code
NEMA	-	National Electrical Manufacturers Association
NFPA	-	National Fire Protection Association
NICET	-	National Institute for Certification in Engineering Technologies
NSF	-	National Sanitation Foundation
NRTL	-	Nationally Recognized Testing Laboratory
OSHA	-	Occupational Safety and Health Act
SMACNA	-	Sheet Metal and Air Conditioning Contractors National Association, Inc.
SSPC	-	Steel Structures Painting Council
OBC	-	Ohio Building Code
IBC	-	International Building Code
UBC	-	Uniform Building Code
UL	-	Underwriters Laboratories, Inc.
USBM	-	United States Bureau of Mines

B. Wherever specific standard numbers are indicated, i.e., ASTM C150, it shall be understood to mean the latest revision thereof.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

SECTION 01300
SUBMITTALS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes requirements for submittals.

B. Contractor shall adhere to the submittal schedule as submitted under the provisions of the General Conditions. Contractor shall modify the schedule as required to allow sufficient time for submittal review based on current construction schedule.

C. Owner, Contractor and Engineer shall utilize the electronic project management system EPMS as specified in Section 01320 for the central repository of project related documents including but not limited to submittals, information for the record and Operation and maintenance manuals.

1.02 COORDINATION OF SUBMITTALS

A. The Contractor shall be responsible for the coordination of submittals and field verifications as required for the various parts of the Work.

B. All submittals to the Engineer, unless otherwise specified, shall be made only by the Contractor. Direct submittals from subcontractors or suppliers will not be accepted.

C. All submittals shall reference the Specification item that it covers, the Contractor's name, the Contract title and location, and the date of submission. Submittal shall also indicate whether the information is for the Engineer's review and approval, for record purposes, or for the fulfillment of the operation and maintenance requirements.

PART 2 PRODUCTS

2.01 GENERAL

A. Two categories of information are normally required:

1. Shop Drawings for review.
2. Information for Record:
   a. Operation and maintenance manuals.

2.02 SHOP DRAWINGS FOR REVIEW

A. Shop Drawings:

1. The Contractor shall submit Shop Drawings in accordance with the General Conditions, as required by individual Sections, shown on the Drawings or as directed.

2. The Contractor shall indicate all variances from the requirements of the Contract Documents in accordance with the General Conditions.

3. The Contractor shall clearly indicate quantities and the exact intended use of the equipment or material contained in the submittal.

4. All Submittals shall be tailored to the project by high-lighting appropriate information and deleting or crossing out nonapplicable information or where applicable the Contractor shall provide a data sheet with all necessary information to correctly identify the applicable Sections of the manuals for the actual material or equipment furnished. All options furnished shall be indicated.

5. Color charts or samples shall be included for all submittals where a color selection by the Owner is required. Original Color Charts (not Color Copies) and samples shall be delivered to the Site, Engineer's RPR or Owner as required. The Engineer shall be copied on the transmittal letter for record purposes.

B. Samples shall be provided as required in the individual Sections. Samples shall be of the precise material proposed to be furnished. The number of samples and sample size shall be the industry standard unless otherwise stated in the individual Sections.

2.03 INFORMATION FOR RECORD

A. Material certificates shall be submitted for materials as indicated in the individual Sections. The certificate shall state that the products have been sampled and tested in accordance with the proper industrial and governmental standards and meet the requirements of the Specifications. Certificates shall be signed by an authorized agent of the manufacturer.

B. Licenses and Permits - The Contractor shall submit copies of all licenses and permits required by Local, State, and Federal laws.

C. Installation and calibration certificates shall be submitted for equipment as indicated in the individual Sections. These certificates shall indicate manufacturer's satisfaction with the installation, the accuracy of calibration and alignment, and the operation of the equipment. Such certificates must be signed by an authorized agent of the manufacturer.

D. Progress Schedules shall be submitted in accordance with the General Conditions and Section 01310.

E. Schedule of Shop Drawings and Sample Submittals shall be submitted in accordance with the General Conditions.

F. Schedule of Values shall be submitted in accordance with the General Conditions.

G. Copy of programming for all PLC's and computers on the project.

2.04 OPERATION AND MAINTENANCE INFORMATION

A. Operation and maintenance manuals shall be submitted as information for the record.

B. Operation and maintenance manuals shall be submitted as electronic documents prior to the printing of the record copy.

1. Contractor shall provide one electronic copy of the manuals for preliminary review.

2. The final accepted manuals shall be provided as one electronic copy of the manual and one printed copy as specified below.

C. Electronic manuals shall be in Portable Document Format (PDF) as generated by Adobe Professional Version 7.0 or newer. The PDF file shall be fully indexed using the table of contents, searchable with thumbnails generated. PDF documents shall have bookmark created in the navigation frame for each major entry (Section, Chapter, Tab) in the table of contents. PDF images shall be at a readable resolution typically 300 dpi or higher. Optical Character Recognition (OCR) capture shall be performed on these images text can be searched, selected and copied from the PDF file.

1. The opening view of each PDF document shall be the bookmarks to the left and cover page or table of contents.

2. The PDF file name shall include the Name of Owner, Project title, Contract Number, and Specification Section. Commonly used abbreviations acceptable to the Owner may be used to minimize length of file name.

3. The Contractors Name shall be the electronic “Author” of the PDF document.

D. This information will be reviewed only if properly identified with Specification Section numbers and only after revised, where necessary, to conform to the Engineer’s notes on previous submittals that have been marked “Make Corrections Noted.” Manuals shall be tailored to suit the specific equipment provided.

E. Submittals shall include but not limited to the following:

1. Descriptive literature, bulletins, or other data covering equipment or system.

2. Complete list of equipment and appurtenances included with system, complete with manufacturer serial number and model number.

3. Utility requirements.

4. General arrangement drawing.

5. Sectional assembly.

6. Dimension print.

7. Materials of construction.

8. Certified performance curve.

9. Parts list with assembly drawings.

10. Recommended spare parts list with part and catalog number.
11. Lubrication recommendations and instructions.
12. Schematic wiring diagrams.
13. Schematic piping diagrams.
14. Description of associated instrumentation.
15. Drive dimensions and data.
16. Operating instructions.
17. Maintenance instructions including trouble-shooting guidelines, lubrication, and preventive maintenance instructions with task schedule.
18. Special tools and equipment required for operation and maintenance.
19. Description of equipment controls.
20. Pump seal data.
21. Assembly, installation, alignment, adjustment, and checking instructions.
22. Confirmation of all corrections noted on Shop Drawings marked “Make Corrections Noted.”
23. Manufacturer’s name, address, and telephone number along with manufacturers job number and Purchase Order number.
24. Manufacturer’s local sales representative, address, telephone number.
25. All installation instructions that were provided to Contractor for use to install equipment.

F. All manuals shall be tailored to the project by high-lighting appropriate information and deleting or crossing out nonapplicable information or the Contractor shall provide a data sheet with all necessary information to correctly identify the applicable Sections of the manuals for the actual equipment furnished. All options furnished shall be indicated.

G. Manuals shall be printed on 8-1/2 by 11-inch size with standard three-hole punching. Large manuals shall be submitted in three-ring binders. Small manuals shall be submitted in folders with metal fasteners. Index tabs shall be furnished for all manuals containing data for three or more items of equipment. All manuals shall have a title label on the cover stating the specification item number and item name. A table of contents shall be included in all manuals.

H. Drawings shall be reduced to 8-1/2 by 11 inch or 11 by 17 inch. Where reduction is not possible, larger drawings shall be folded separately and placed in envelopes which are bound into the manual.

I. Equipment installations shall not be considered substantially complete until all associated operation and maintenance manual submittals are accepted by the Engineer.

J. Field modifications to equipment during installation shall be included in the manual so that the manual reflects as-built conditions. Revisions to the manual may be submitted for incorporation into the manual where appropriate. However, the Engineer reserves the right to return all six manuals for revision to reflect as-built conditions.

PART 3 EXECUTION

3.01 IDENTIFICATION OF SUBMITTALS

A. All submittals shall have a Submittal Identification & Approval cover sheet attached. A sample of the submittal cover sheet is attached for reference. The form will be provided by Engineer and coordinated with Contractor.

B. All submittals shall be given a consecutive number when they are entered into the Electronic Project Management System (EPMS), See Section 01320.

C. Resubmittals shall be entered into EPMS as resubmittals.

D. Submittals to satisfy the operation and maintenance information requirements shall be entered into the EPMS as a submittal. The description shall have the prefix “OM”.

3.02 PRINTING AND DISTRIBUTION

A. Contractor shall provide printed copies of approved submittals and deliver them to the Owner and Engineers RPR at the Site.

B. Contractor shall provide one printed copy of the approved operation and maintenance manual and the electronic copy on portable electronic media device to the Owner.

C. Contractor shall provide printed copies of submittals, project information or documents required to satisfy the building permit and inspections as may be required by the governing agency.

1. The Engineer will provide the stamped/sealed Contract Drawings for the initial filing of the building permit applications.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

Submittal Identification & Approval

Date:

Spec Section

Submittal No.

Drawing Sheet No.

Description:

Manufacturer(s)

Contractor Comments/Deviations/Measurements

Contractor

Contractor Name

- ☐ Approved
- ☐ Forwarded
- ☐ Checked

By: _____ Date: _____

Engineer

SHOP DRAWING REVIEW
SUBJECT TO CONTRACT REQUIREMENTS

Jones & Henry Engineers, Ltd.

- ☐ Approved
- ☐ Approved—Make Corrections Noted
- ☐ Amend & Resubmit
- ☐ Rejected—See Remarks
- ☐ Distribute for Information

REVIEW IS FOR GENERAL COMPLIANCE WITH CONTRACT DOCUMENTS. NO RESPONSIBILITY IS ASSUMED FOR CORRECTNESS OF DIMENSIONS OR DETAILS

Approval in no way relieves the Contractor of any responsibility for capacities, performance, functions, compliance with Federal, State, and Local Codes; accuracy of dimensions and details; or continuity and completeness of the Project nor does approval constitute or imply any increase in Contract Price.

By: _____

Review Comments

SECTION 01310
CONSTRUCTION SCHEDULES AND DOCUMENTATION

PART 1 GENERAL

1.01 SCOPE

A. This Section includes the requirements for construction schedules and construction sequences.

B. This Section includes the requirements for the tracking and documentation of the progress and activities driving the completion of the Work as specified, shown on the Drawings and as directed.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Information for the Record:

a. Preliminary Construction Schedule.

b. Contractor's Construction Schedule and monthly updates.

c. Submittals Schedule.

B. Contractor shall submit the construction schedule electronically, as a submittal, unless approved otherwise by the Engineer.

1.03 QUALITY ASSURANCE

A. Scheduling conference shall be held prior to the commencement of the construction to discuss the following including, but not limited to:

1. Construction sequencing.

2. Contractor's coordination of subcontractors.

3. Coordination with the Owner's operations.

4. Coordination with other Contractor's or other Work.

5. Project milestones.

6. Owner's partial utilization.

PART 2 PRODUCTS

2.01 PRELIMINARY CONSTRUCTION SCHEDULE

A. Preliminary construction schedule shall be completed in accordance with the General Conditions and prior to the scheduling conference.

B. The preliminary schedule shall outline the Contractor's sequencing of tasks, activities, milestones, and all critical path items within the contract time.

2.02 CONSTRUCTION SCHEDULE

A. The Contractor's submission of the construction schedule will not change the contract completion date, whether reviewed by the Owner and Engineer or not. The Contractor shall incorporate all approved change orders that have resulted in a contract time extension.

B. The Contractor shall require all subcontractors engaged in the Work to submit to the Contractor construction schedules, as specified herein, for incorporation into the Contractor's construction schedule.

C. The construction schedule shall include, but not limited to, the following dates:

1. Notice to Proceed.
2. Substantial Completion and Final Completion.
3. Commencement of on-site operations.
4. Milestones as specified, shown on the Drawings, and as directed.
5. Ordering, submittals, fabrication, delivery, startup, and training time of major equipment items.
6. Submittal schedule per the General Conditions.

D. The Contractor shall incorporate into the construction schedule all constraints and work restrictions specified or otherwise required by the Contractor's operations, including, but not limited to, the following:

1. Construction sequencing.
2. Contractor's coordination of subcontractors.
3. Coordination with the Owner's operations.
4. Coordination with other Contractor's or other work.
5. Project milestones.
6. Owner's partial utilization.

2.03 UPDATING CONSTRUCTION SCHEDULE

A. The Contractor shall keep the construction schedule current to the progress of the Work continually through closeout of the project. The construction schedule shall be submitted monthly for the Engineer's review.

2.04 WEEKLY CONSTRUCTION SCHEDULE

A. The Contractor shall submit a schedule of his work for each week. This schedule shall identify the foreman of each work crew and the location and type of work the crew will be doing each day. It shall be delivered no later than 4:00 p.m. of the next to last regular workday of the preceding week to the Resident Project Representative's office.

PART 3 EXECUTION

3.01 COORDINATION

A. All phases of the Work requiring interference with normal operations of the existing facilities shall be scheduled in accordance with agreements among the Contractor, Owner, and Engineer. The Contractor shall notify the Owner at least one week before such Work is to begin.

PART 4 SPECIAL PROVISIONS

4.01 SCHEDULED NON-WORK DAYS

A. The Contractor shall restrict Work to 7 a.m. to 5 p.m. and consider the following list of holidays as mandatory non-work days, all of which shall be incorporated into the construction schedule:

1. New Year's Day.
2. Memorial Day.
3. Fourth of July.
4. Labor Day.
5. Thanksgiving Day.
6. Christmas Eve Day.
7. Christmas Day.

END OF SECTION

SECTION 01350
COMMON PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes general requirements for all materials, equipment and systems furnished or installed under this project.

B. Additional specific requirements included under a particular Section shall take precedence.

C. This Section includes, but is not limited to, the following procedural and administrative requirements:

1. Product Delivery Storage and Handling.
2. Warranties.
3. Quality Assurance and Control.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and related specification sections.

B. The specification sections and Drawings contain the specific submittal requirements.

1.03 QUALITY ASSURANCE

A. Where Contractor is required to provide design services or certification of the design, the specified product, equipment or system shall comply with the specified criteria.

1. Contractor shall submit a written request for clarification when specified criteria is incomplete or insufficient.

B. Manufacturer's name, make, model number and other designations provided in the contract documents are to establish the significant characteristics, including but not limited to, type, function, dimensions and physical properties, performance, and appearance for the purpose of evaluating comparable products. Contractor shall verify product, equipment or system proposed meets or exceeds the requirements as specified or shown on the Drawings.

1.04 PROJECT HANDLING

A. Schedule delivery to minimize the time goods are kept in storage.

B. Deliver goods to Site in manufacturer's original packaging.

C. Inspect the goods to determine if there is visible damage to the packaging.

1. The packaging shall be removed in a manner that will allow resealing for storage.

2. If packaging cannot be removed and reused, the goods shall be repackaged per the manufacturer's recommendations.

D. Goods that are susceptible to damage by the environmental or project conditions, including but not limited to, switchgear, motor control centers, panelboards, instrument control panels, fixtures shall be stored in a controlled environment per the manufacturer's recommendations. If no such area is available at the time such equipment is received, such space shall be provided by the Contractor at no expense to the Owner.

E. Where construction is in roads or streets, that portion of the right-of-way not required for public travel may be used for temporary storage purposes unless otherwise prohibited. Materials shall not be stored in areas where such storage creates a hazard. Any other additional space required for construction or storage of materials and equipment shall be obtained by the Contractor at his expense.

F. The Contractor shall confine his equipment, the storage of materials and equipment, and the operations of his workers to areas permitted by law, ordinances, permits, and the requirements of the Contract Documents, and shall not unreasonably encumber the premises with materials or equipment.

1.05 GUARANTEE

A. Manufacturer's warranty, extending beyond one-year after substantial completion for the specified product, equipment or system shall be provided to the Owner and endorsed by the manufacturer.

B. Requirements for warranties extending beyond one-year after substantial completion are described in individual Sections of these specifications.

C. Manufacturer's limitations and disclaimers shall not relieve the Contractor from warranty obligations under the Contract Documents.

PART 2 PRODUCTS

2.01 SHOP PAINTING

A. Non-galvanized ferrous surface shall be painted.

B. Shop painting of ferrous surfaces shall be as follows:

1. Surfaces shall be thoroughly cleaned of dirt, grease, oil, rust, scale, or other foreign substances. All metal surfaces shall, as a minimum, be abrasive blasted in accordance with SSPC-SP6, Commercial Blast Cleaning. More stringent surface preparation shall be provided where required by Section 09900.

2. Surfaces shall receive a shop coat of a primer compatible with the finish coating to be used by the Contractor and specified in Section 09900.

2.02 GALVANIZING

A. Where galvanized metal is indicated, unless otherwise specified, galvanizing shall conform to ASTM A123 (Hot Dip Galvanized). Threaded parts and hardware shall be galvanized in conformance with ASTM A153.

2.03 REGULATORY REQUIREMENTS

A. Materials, equipment, coatings, and chemicals in contact with potable water or water being treated for potable water use shall comply with the applicable NSF Standards.

PART 3 EXECUTION

3.01 INSTALLATION

A. Products shall be installed in accordance with the manufacturer's instructions and Contract Documents.

B. Required appurtenances including but not limited to, anchors, grout, and leveling shims, shall be provided.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

SECTION 01410
LABORATORY SERVICES

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall retain an independent laboratory.

B. Testing, inspection(s) and quality control are required to certify compliance with the Contract Documents.

1. The laboratory services do not relieve the Contractor from the responsibility of compliance with the Contract Documents

2. Any test required by the Owner shall not relieve the Contractor from the responsibility of compliance with the Contract Documents.

3. Any test required by the Owner shall not relieve the Contractor from the responsibility of supplying certificates from manufacturers or suppliers to demonstrate compliance with the Specifications.

C. Specific testing, inspection(s) and quality control requirements are specified in the individual Sections of the specifications.

D. Specific testing, inspection(s) and quality control requirements of any Federal, State or Local authorities are specified in the related sections of Work.

E. Testing of materials or equipment for compliance with various national or technical society standards and ordinarily performed by manufacturers, and shop and field tests of equipment are not included under this Section but shall be performed by the Contractor or his supplier as specified elsewhere.

F. Contractor may conduct material or field test(s), inspection(s) and quality control as they deem necessary.

1. Should the Contractor, at any time, desire the Owner to consider the results of such testing, inspection(s), and quality control, such results shall be certified by an independent testing laboratory acceptable to the Owner. Any testing of this nature shall be conducted at the Contractor's expense.

1.02 SUBMITTALS

A. Submittals of all required field and laboratory test results shall be made by the independent laboratory as soon as they are available to the Owner and Engineer directly.

1. Statement of Compliance per 1.03

1.03 QUALITY ASSURANCE

1. The laboratory shall be a recognized and independent commercial laboratory with experience in conducting the required tests.
2. Laboratory shall certify compliance with ASTM E548, ASTM E329, and ASTM C1093 when masonry construction is part of the project scope. In lieu of ASTM certification, the laboratory may submit written documentation demonstrating experience and training relevant to the inspections to be performed. The documentation shall demonstrate experience with projects of similar complexity and quantity of inspections as the project herein.
3. Testing, inspection(s) and quality control shall be certified by a professional engineer specialized in the related field and in the state where the Site is located.

PART 2 PRODUCTS

2.01 TESTS

A. Aggregates, Bedding Material, and Special Backfill - For each type of material, the laboratory shall perform an ASTM C136 sieve and screen analysis to determine compliance with the contract documents.

1. Retests shall be performed until the Specifications are met.
2. Retest shall be performed each time the source of material is changed.

B. Selected Backfill - At the discretion of the Engineer, but in no case, more than one test for each 1,000 cubic yards or portion thereof, the laboratory shall perform an ASTM C136 sieve and screen analysis to determine whether the material is suitable for backfilling purposes.

C. Mix Designs:

1. For each type of controlled density fill, concrete, and asphalt, the laboratory shall review, perform test(s).
2. Review, perform test(s) and approve change in source of materials.
3. The asphalt design shall be made in accordance with ASTM D1559, the Marshall Method of Mix Design and as specified.
4. Approved mix designs shall include sieve analyses and suppliers' certificates for materials incorporated in the mix.

D. Compaction Tests:

1. For each type of backfill material, the laboratory shall determine the moisture-density curve according to ASTM D698.
2. Using ASTM D2922 test methods, the laboratory shall determine the density of placed backfill.

3. Retests shall be performed if the compaction requirements stated in the individual Sections are not met.

4. The Engineer may at his discretion require the sand cone (ASTM D1556) or the balloon (ASTM D2167) tests for density and compaction to verify questionable results of the ASTM D2922 tests.

E. The independent testing laboratory shall test and report the soil bearing capacity under all foundations and slabs on grade. The testing shall be conducted at regular intervals in all directions. The independent testing laboratory shall immediately notify both the Contractor and Engineer of any such test not meeting the presumed soil bearing capacity contained in the Structural Design Data on the Drawings.

F. Asphalt and Concrete Quality Control Testing - Perform tests as indicated in Sections 02600 and 03300.

G. Miscellaneous Tests - Perform all other tests requested in the individual Sections of the Specifications.

2.02 PLANT INSPECTIONS

A. Inspect and certify asphalt and concrete plants as indicated in Sections 02600 and 03300, respectively.

2.03 EQUIPMENT

A. Provide all necessary equipment to extract and store samples and perform the required tests.

PART 3 EXECUTION

3.01 COORDINATION

A. The Contractor shall provide the source of all materials requiring testing and shall arrange access for the independent laboratory to obtain representative samples and perform required tests at the material source. The information shall be supplied in advance to allow time for testing and reporting. Concrete information shall be supplied at least 45 days prior to the first concrete placement.

B. Contractor shall coordinate activities to accommodate the required quality assurance/control.

1. Contractor shall not compromise the requirement for quality assurance /control in order to maintain the schedule.

C. The laboratory shall conduct tests on materials and in locations as directed by the Resident Project Representative.

D. All tests shall be performed in accordance with the proper test methods mentioned above and in the individual Sections. Results shall be compared to the required values included in the individual Sections.

3.02 PREPARATION

A. Contractor shall prepare all Work to be tested in accordance with the testing procedures as directed and required by independent laboratory, regulatory agency, or Owner and Owner's representative.

3.03 PROTECTION

A. Contractor shall at the completion of testing, repair damage to construction in accordance with these specifications.

B. Contractor shall be responsible for the protection regardless of the responsibility for quality assurance/control.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

SECTION 01500
MAINTAINING TRAFFIC

PART 1 GENERAL

1.01 SCOPE

A. This Section includes the furnishing of all labor, materials, equipment and services necessary for maintaining and protecting vehicular and pedestrian traffic.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Information for the Record:

a. The Contractor shall submit the name, address, and telephone number of a local individual who will be responsible for maintaining traffic facilities when the Contractor is not working.

b. Traffic control or maintenance plans with govern authority(s) approval.

c. Detour routes with governing authority(s) approval.

d. Delivery and haul routes for contractor's activities outside the zone of influence.

1.03 QUALITY ASSURANCE

A. The installation, maintenance, and operation of all traffic controls and traffic control devices shall conform to the requirements of the State Department of Transportation Manual of Uniform Traffic Control Devices for Streets and Highways, hereinafter called the MUTCD.

B. If, in the opinion of the authority having jurisdiction over traffic in the affected thoroughfares, proper maintenance of traffic facilities and proper provisions for traffic control are not being provided by the Contractor, they may take the necessary steps to place them in proper condition, and the cost of such services will be deducted from any money which may be due or become due the Contractor.

C. A traffic control conference, attended by Owner, Engineer, Contractor and governing authority, shall be held no later than 14 days prior to any traffic maintenance, placement of traffic control devices, lane closures, detouring of traffic or other activity that impedes the normal traffic flow.

PART 2 PRODUCTS

2.01 TRAFFIC CONTROL DEVICES

A. Traffic control devices shall be provided with suitable supports of sufficient strength and stability.

B. Faces of orange construction signs, barricades, vertical panels and drum bands shall be suitably reflectorized with sheeting.

C. Traffic cones shall be a highly visible orange color.

D. Pavement markings for traffic maintenance shall conform to the requirements of ODOT, the local authority and the MUTCD.

2.02 TEMPORARY TRAFFIC SIGNALS

A. The Contractor shall furnish, erect, maintain, and subsequently remove signal and signal controller equipment of a proper type and capacity to provide the required operation, and shall meet the general requirements of ODOT and the MUTCD.

1. Any malfunctions or failures shall be corrected without delay. Temporary traffic signals not in use shall be covered or removed.

B. The Contractor shall be responsible for the procurement of and payment for electric power for temporary traffic signals.

PART 3 EXECUTION

3.01 COORDINATION

A. The Contractor shall provide and maintain in safe condition such temporary facilities for vehicular and pedestrian traffic as may be necessary to provide safe vehicular and pedestrian ingress and egress for all property adjacent to the improvements. Such access shall be provided at all times unless workers or machinery are in the immediate area. Access shall be provided to all properties at the end of the Work day.

B. When the street or highway under construction is being used by vehicular traffic including periods of suspension of the Work, the Contractor shall maintain that portion of the street or highway being used to ensure that it is smooth, free from holes, ruts, ridges, bumps, and dust.

C. The Owner will enter upon that portion of a project, where the Contractor is responsible for maintaining through traffic on part or the entire project, to place abrasives at its own expense, as may be considered advisable.

1. The Contractor shall be responsible for the removal of abrasives placed, for which no claim for additional compensation shall be allowed nor shall the Contractor be relieved in any way of his obligation for maintenance of traffic.

D. The Owner will provide for the necessary maintenance of public streets or highways which are used as detour beyond the Work limits of the contract.

3.02 TRAFFIC CONTROL

A. Barricades, vertical panels, and cones shall be protected by adequate advance warning construction signs.

B. Equipment and material stored on the highway shall be marked at all times. At night, any such material or equipment stored within rights-of-way and easement(s) shall be clearly outlined with dependable lighted devices.

C. Contractor shall provide any other lights, barricades, etc., that may be needed for the protection of pedestrian traffic in all areas where materials are stored.

D. Road Closed - When a highway is permitted to be closed to traffic, the Contractor shall provide, erect, maintain, and subsequently remove approved traffic control devices, barricades, and suitable and sufficient red or yellow lights.

3.03 TRAFFIC MAINTAINED

A. Where the street or highway under construction is being used by vehicular traffic, including periods of suspension of the Work, the Contractor shall furnish and maintain pavement markings, lights, warning signs, road construction traffic maintained signs, and end construction signs, barricades, temporary guardrail, and such other traffic control devices, and flaggers as may be necessary to maintain safe traffic conditions within the Work limits.

B. Existing signs and traffic control devices within the Work limits shall remain in use during the construction period. If the Contractor needs to relocate or modify permanent signs and other traffic control devices as a consequence of his work, he shall provide suitable supports and may modify the devices with prior approval of the Engineer and the concurrence of the maintaining agency. Routine maintenance of permanent traffic control devices will remain the responsibility of the maintaining agency.

C. The function of existing Stop or Yield signs shall be retained at all times although their position may be adjusted. Existing signs that must be relocated laterally shall be placed in accordance with the MUTCD.

D. When an existing signal operation must be interrupted for a period, the Contractor shall provide a temporary traffic control method.

E. The Contractor shall obtain the approval of the Owner and Engineer before closing a traffic lane or establishing a one-way traffic operation.

F. Flaggers:

1. Whenever one-way traffic is established, at least two flaggers shall be used and signs, cones, barricades, and other traffic control devices shall be erected by the Contractor in accordance with the MUTCD. The Contractor shall maintain positive and quick means of communication between the flaggers at the opposite ends of the restricted area.

2. Flaggers shall be equipped according to the standards for flagging traffic contained in the MUTCD. At night, flaggers' stations shall be adequately illuminated.

3. The Contractor may, in lieu of flaggers, or supplementing them, furnish, install, and operate a temporary traffic signal or signals, for the purpose of regulating traffic.

3.04 SNOW AND ICE REMOVAL

A. The state and local authority responsible for snow and ice removal will be responsible for removals during the construction provided the following:

1. The project area is open to public access.

2. In the opinion of the state and local authority the project area is accessible with their equipment.

3. In the opinion of the state and local authority the street surface will not cause damage to their equipment or their equipment will not cause damage to the street.

B. The Contractor shall be responsible for snow and ice removal during construction when:

1. The project area is closed to public access.

2. When Limited access is provided for local traffic but area is closed to through traffic.

3. The project area pavement has removed or damaged to the extent that the state and local authority's equipment will no longer effectively remove snow and ice or will cause damage to project area.

PART 4 SPECIAL PROVISIONS

4.01 RESTORATION OF PAVEMENT SURFACES OUTSIDE THE ZONE OF INFLUENCE

A. Contractor shall restore all damaged pavement surfaces in streets used by the Contractor for moving materials and equipment to and from the construction area and streets used for bypassing or detouring traffic around the construction area.

B. Materials used in replacing damaged areas of the road shall be as specified in Section 02600 of these Specifications.

C. The pavement shall be restored with pavement of the same type and thickness as the existing pavement, in accordance with Section 02600 of these Specifications.

4.02 CLOSURES & DETOURS

A. Industrial Drive Pump Station - The two parking lot entrances directly South of the pump station (between the existing pump station and the first manhole upstream of the pump station – MH 10074), are to be provided with temporary vehicle ramps to permit the

bypass pumping piping to lay on the ground and vehicular traffic to travel over the piping.

END OF SECTION

SECTION 01568
POLLUTION CONTROL

PART 1 GENERAL

1.01 SCOPE

A. This Section includes the requirements for pollution control.

PART 2 PRODUCTS

2.01 GENERAL

A. Dust palliatives shall conform to ODOT Item 616.

PART 3 EXECUTION

3.01 OHIO GENERAL REQUIREMENTS

A. The Contractor is responsible to obtain and pay for NPDES Permit for storm water discharge.

B. The Contractor is responsible for following an erosion control plan in accordance with the requirements of the Clean Water Act, 33 USC Section 1251 et seq. and the OWPCA, ORC 6111.01 et seq. and related rules. The Contractor warrants and agrees that it is equipped to limit water pollution for its activity according to applicable Federal and State standards.

C. It shall be the responsibility of the Contractor to prevent or limit pollution of air and water resulting from his operations.

D. The Contractor shall perform Work required to prevent soil from eroding or otherwise entering onto all paved areas and into natural watercourses, ditches, and public sewer systems, and to prevent dust attributable to his operations from entering the atmosphere.

E. Excess soil that is stockpiled shall be removed or regraded within 15 days of the completion of construction.

F. If Work is suspended for any reason Contractor shall maintain the soil erosion and sedimentation controls in good operating condition during the suspension period. When suspension period will exceed one month the Contractor shall seed fertilize and mulch disturbed areas left exposed during work suspensions.

3.02 STREETS, SIDEWALKS AND DRIVEWAYS

A. Streets, haul roads, and detours and bypass roads shall be swept by automatic self-contained sweepers.

B. Excessive dirt on pavements shall be removed by means of hand shoveling or appropriate mechanical equipment and the area swept as directed above.

C. Sidewalks and driveways shall be cleaned by means of shovels and hand brooms or appropriate mechanical equipment.

D. Dust on unsurfaced streets or parking areas and any remaining dust on surfaced streets shall be controlled with calcium chloride dust palliative.

E. The Contractor shall comply with the above requirements on a daily basis. If the Contractor fails to perform the above Work in a satisfactory manner, all Work, except cleanup operations, shall be stopped until the Contractor has complied with the above requirement.

3.03 EROSION AND SEDIMENT CONTROL

A. The Contractor shall initiate appropriate vegetative practices on all disturbed areas to remain dormant (undisturbed) for more than 45 days within seven days.

1. Such practices may include: temporary seeding, permanent seeding, mulching, matting sod stabilization, vegetative buffer strips, phasing and protection of trees.

B. Permanent or temporary soil stabilization shall be applied to disturbed areas within seven (7) days after final grade is reached on any portion of the Site.

C. When seasonal conditions prohibit the application of temporary or permanent seeding, non-vegetative soil stabilization practices, such as mulching and matting, shall be used.

D. A stabilization construction entrance shall be provided to reduce vehicle tracking of sediment. The paved street adjacent to the Site entrance shall be swept a minimum of daily, or as needed, to remove any excess mud, dirt, or rock being tracked from the Site.

1. Dust and sediment along any street due to construction on this Site is to be swept a minimum of once at the end of the day or as necessary to prevent a build-up of dust and soil on the pavement surface.

E. Dump trucks hauling from the construction site shall be covered with a tarpaulin.

F. No more than 200-feet of trench shall be open at any given time. Trench opening, laying of pipe, and backfilling should occur so as to minimize the amount of disturbed area.

G. The Contractor shall minimize the width of his work area.

H. Existing trees, shrubs, and other ground cover vegetation shall be preserved where possible. Tree removal will be limited to that necessary for construction and will be limited further to the permanent easement wherever possible. No tree removal will be permitted outside the temporary easement.

I. Storm water runoff and natural stream flow shall be intercepted or diverted when originating upgrade away from the construction site so as to minimize the amount of flow over the construction site.

J. All dewatering flows are to be settled in siltation basins or directed through filters before discharge to stabilized sites, such as stream or storm sewers, and not onto exposed soils, stream banks, or any other sites where the flow could cause erosion.

K. When construction occurs near storm sewer inlets, erosion control measures such as inlet filters or hay bales shall be used to prevent silt from entering the storm sewers.

L. The clean-up and disposal of excess excavated material shall be done as soon as practical after laying of the pipe. However, clean-up work shall not fall behind the pipe laying more than 800-feet. Should the Contractor not keep his clean-up within the aforementioned distance, Work shall stop until the clean-up work is accomplished.

3.04 OHIO SEDIMENT CONTROL

A. Contractor shall control erosion and trap sediment from all sites remaining disturbed for more than 14 days. Such practices shall include among others, sediment traps, sediment basins, silt fences, and storm drain inlet protection. Silt Fence fabric shall be ODOT Item 712.09 type C Geotextile Fabric.

B. Timing - Sediment control structures shall be functional throughout earth-disturbing activity. Sediment ponds and perimeter sediment barriers shall be implemented as the first step of grading and within seven days from the start of grubbing. They shall continue to function until the upslope development area is restabilized.

C. Settling Ponds - Concentrated storm water runoff from disturbed areas flowing at rates which exceed the design capacity of sediment barriers shall pass through a sediment settling pond. The facility's storage capacity shall be 67 cubic yards per acre of drainage area.

D. Sediment Barriers - Sheet flow from runoff from denuded area shall be intercepted by sediment barriers. Sediment barriers, such as sediment fences or diversions directing runoff to settling facilities, shall protect adjacent properties and water resources from sediment transported by sheet flow.

E. Other erosion and sediment control practices shall prevent sediment-laden water from entering drain systems, unless the storm drain system drains to a settling pond. These practices shall divert runoff from distributed areas and steep slopes where practicable and stabilize channels and outfalls from erosive flows.

3.05 CONSTRUCTION OF SLOPES

A. The Contractor shall comply with the following requirements when working on slopes exceeding 4:1.

1. The pipeline shall be constructed during dry weather, low flow periods as determined by the Engineer. The construction time for this Work shall be limited to the shortest time possible in order to minimize environmental impacts.

2. Construction equipment shall be limited to trenching equipment or rubber tired backhoes in order to prevent soil erosion and maintain slope stabilization.
3. Biodegradable mesh shall be used for slope stabilization. The mesh shall cover the entire width of disturbed ground.
4. The trench shall be backfilled immediately after installation of the pipe. The disturbed areas shall be graded, seeded, and mulched within 24 hours after backfilling. The Contractor shall maintain all seeded and mulched areas in accordance with the specifications until final acceptance of the Work.
5. The Contractor shall place straw or hay bales at the base of the slopes for sedimentation control. The bales shall be placed prior to construction of the pipeline and shall remain until final seeding has germinated and become established.

3.06 STREAM CROSSING

A. Prior to the onset of any stream crossing silt barriers shall be placed along banks, where vegetation and trees are removed, or soil will be exposed.

B. A stream crossing shall not commence until Contractor is prepared to complete the Work in a continuous operation. Once started the Work in the stream shall be continued until it is completed.

C. Construction of the stream crossings shall occur only during dry weather low-flow periods. Wherever possible, use of heavy equipment during crossing construction is to be restricted to the stream bank and is not to be permitted in the stream channel.

D. The width of stream banks disturbed in constructing a stream crossing shall be limited to the width of the trenching machine.

E. Immediately after the conduit and any required concrete encasement is in place, the re-establishment of channel contours and bank stabilization shall commence. The stream crossing and associated restoration shall be completed within 48 hours of initiation.

F. To minimize erosion, the Work of clearing, grading, excavation, pipe installation, backfilling, erosion protection, final cleanup and all other Work within 50-feet of the stream shall be performed immediately following installation of the Work within the stream.

G. Construction equipment shall be kept out of the stream channel whenever possible.

3.07 PROHIBITED CONSTRUCTION ACTIVITIES

A. Disposing of excess or unsuitable excavated material in wetlands or floodplains, even with the permission of the property owner.

B. Locating stockpile storage areas in environmentally sensitive areas.

C. Indiscriminate, arbitrary, or capricious operation of equipment in any stream corridors, any wetlands, any surface waters, or outside the easement limits.

D. Pumping of sediment-laden water from trenches or other excavations directly into any surface waters, any stream corridors, any wetlands, or storm sewers; all such water will be properly filtered or settled to remove silt prior to release.

E. Discharging pollutants such as chemicals, fuels, lubricants, bituminous materials, raw sewage and other harmful waste into or alongside of rivers, streams, impoundments, or into natural or man-made channels leading thereto.

F. Permanent or unspecified alteration of the flow line of any stream.

G. Damaging vegetation outside of the construction area.

H. Disposal of trees, brush, and other debris in any stream corridors, any wetlands, any surface waters, or at unspecified locations.

I. Open burning of project debris without a permit.

J. Discharging injurious silica dust concentrations into the atmosphere resulting from breaking, cutting, chipping, drilling, buffing, grinding, polishing, shaping or surfacing closer than 200 feet to places of residences or places of human occupation.

K. Storing construction equipment and vehicles and/or stockpiling construction materials on property, public or private, not previously specified on the Drawings or not authorized by the Owner or Engineer for such purpose.

L. Running well point or pump discharge lines through private property or public property and rights-of-way without the written permission of the property owner and the consent of the Engineer.

PART 4 SPECIAL PROVISIONS

4.01 STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

A. The Drawings show recommendations for pollution prevention measures to be provided. The measures shown on the Drawings shall be considered the minimum level of pollution prevention.

B. The Contractor shall adhere to the SWPPP in accordance with OEPA Guidelines.

END OF SECTION

SECTION 01800
CONSTRUCTION SURVEY WORK

PART 1 GENERAL

1.01 SCOPE

A. This Section includes the furnishing of all labor, materials, equipment, and services necessary for the completion of Construction Survey Work in accordance with the Contract Documents.

B. This Work consists of the layout of all lines and grades shown on the Drawings or as altered or modified by the Engineer, control survey and of miscellaneous survey work related to construction of the project.

1.02 PROJECTION

A. The Contractor shall protect and preserve the established reference points and monuments.

B. Whenever monuments are encountered in the line of Work, whether shown on the Drawings or not, the Contractor shall notify the Engineer in writing at least 24 hours in advance of moving same, and under no circumstances is such a stone or other monument to be removed or disturbed by the Contractor or by any of his men without a written order of the Engineer and only when a registered surveyor representative of the Owner is present.

1.03 REPLACEMENT OF LOST SURVEY POINTS

A. Whenever a reference point or monument is lost or destroyed or requires relocation, the Contractor shall, at his own expense, accurately relocate and replace all such points so lost, destroyed, and moved.

1.04 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Information for the Record:

a. Layout Sheets including, but not limited to, Benchmarks both temporary and permanent and Pipeline layout staking.

b. Field Notes and survey log.

c. Profile over Proposed Tunneled, Jacked, or Bored Pipe.

d. Certified Survey of Tunneled, Jacked, or Bored Pipe.

B. Contractor shall provide the Engineer and Resident Project Representative, no later than five working days prior to installation, all Logs, reports, field notes, drawings and documentation as specified shown on the Drawings or directed.

C. No pipeline or related Work shall be considered for payment until all logs, reports field notes drawings and documentation as specified, shown on the Drawings or directed has been submitted to the Engineer or Engineers representative.

PART 2 PRODUCTS

2.01 CONSTRUCTION STAKING

A. All construction points shall be marked with a wooden hub and nail or a PK nails in concrete and asphalt pavements and walks.

B. All points located in areas of heavy underbrush, inaccessible or limited site distance shall be identified with a wood lath extending a minimum of 3 feet above the ground.

C. All points located in paved surfaces shall be clearly marked with paint. Contractor shall obtain written permission from owner to use paint for marking.

PART 3 EXECUTION

3.01 COORDINATION

A. The Contractor shall provide field forces necessary to lay out the location, alignment, elevation, and grade of the Work shown on the Drawings and in conformance with the control points and benchmarks shown on the Drawings.

B. The Contractor shall use competent personnel and suitable equipment for the layout of the Work required. If the layout Work involves more than a few simple distance and elevations from established reference points, the Contractor shall employ a Registered Surveyor to supervise the layout Work.

C. Contractor shall furnish the necessary labor to assist the Engineer in checking the installation, if required.

3.02 EXISTING CONNECTION POINTS

A. The Contractor shall verify critical elevation points of the existing utilities prior to commencing installation of Work. Critical points shall include all points where new Work connects to existing utilities and existing utilities that could be conflicts with Work. All data shall be provided to the Engineer before commencing Work.

3.03 RIGHTS-OF-WAY AND EASEMENTS

A. Rights-of-way or easement(s) shall be staked at points along the boundaries so that at least two stakes can be seen distinctly from any point along the boundary line. The staking shall not exceed 200-feet in any direction. All points of change in width or direction of the rights-of-way or easement(s) boundary line shall be staked.

B. When the Contractor performs construction and the zone of influence is within 10-feet of a rights-of-way or easement(s) boundary line, they shall place stakes properly identifying points of change in width or direction of the boundary line and at points along the boundary line not to exceed 25-feet.

3.04 PAVEMENT

A. The Contractor shall establish a layout for location and grade on both sides of the road and 5-feet off the edge of the pavement or back of curb. Layout line shall consist of stakes set at station intervals necessary for the topography and environment to assure conformance to planned line and grade. Stakes shall be set at a minimum every 50-feet, at all vertical and horizontal points of curvature and points of tangent, and at all vertical high or low points.

B. Stakes for line and grade of pavement and curb shall be set at station intervals necessary for the topography and environment, not to exceed 50-feet, and at low and high points of vertical curves to assure conformance to planned line and grade.

3.05 PIPE IN OPEN CUT

A. The Contractor shall utilize a laser beam for establishing line and grade when installing pipeline in open-cut construction. In order to maintain control during pipeline installation and to obtain the required field data for the record documents (G.C. 6.19) the Contractor shall establish construction and layout stakes. These stakes shall be based on the contract documents and the survey control data as provided by the Engineer.

B. The construction staking shall be placed along the pipeline route at and at location of new manholes, valves, deflections both vertical and horizontal and as specified, shown on the Drawings or as directed. All construction layout stakes shall be offset at a minimum of 10-feet and at a right angle to the pipe line route. Layout shall be referenced to the downstream manhole or valve, in addition it may reference survey of baseline stationing.

C. Contractor shall provide to the Engineer, no later than five working days prior to the installation of the pipeline, all information of the completed construction layout staking. This information shall include but not be limited to stationing, elevations, control points, project coordinates, offset direction and distance for all deflections both horizontal and vertical, manholes and all other points as specified, shown on the Drawings and directed by the Engineer.

D. The grade of pipe in open-cut, whether placed by laser beam or other approved methods, shall be checked using surveying equipment. The Contractor shall have a surveyor’s level and level rod on the Site at all times when pipeline and appurtenances are being installed. The level rod shall be equipped with an attached “shoe” extension on the bottom for placing on the pipe invert. The pipe invert elevation shall be checked at a maximum of 50-feet intervals or more often as directed by the Engineer. Checks will

be performed by the Contractor and results, including but not limited to layout station shall be recorded in contractor's field log.

E. The Contractor shall furnish all equipment and labor and check his alignment from the offset stakes. Contractor shall record all information in the log.

F. Any inspection or checking of the Contractor's layout by the Engineer shall not relieve the Contractor of his responsibility to secure the proper dimensions, grades, and elevations of the Work.

3.06 RESERVED

3.07 RESERVED

3.08 LOCATION OF STRUCTURES AND UNDERGROUND PIPING

A. The location of new structures and underground utilities shall be based on the dimensions, coordinates, and requirements shown on the Drawings or specified.

B. If it is stated on the Drawings or specified that the location and/or elevation of the new structure or underground piping shall depend on the location of existing underground or otherwise hidden facilities, those existing underground or hidden facilities shall be located by the Contractor prior to his determination of the location and/or elevation of the new facilities. This requirement shall override any other specific location dimensions or coordinates shown on the Drawings for that structure or piping.

C. If the location or elevation determined by the Contractor, in accordance with the above requirements, appears to cause conflicts with existing structures or utilities or appears to potentially cause functional issues with either the existing or new structures or utilities, the Contractor shall notify the Engineer immediately.

D. In no case, shall coordinates or other location information be extracted or interpolated from the electronic CAD files that may be provided to the Contractor by the Owner or Engineer without the specific approval of the Engineer.

3.09 CURB AND GUTTER ELEVATIONS

A. In locations where the existing curb and gutter shall be removed as part of the Work, the Contractor shall be responsible for reconstructing the existing curb and gutter to match existing alignment, elevations and grades. The Contractor shall be responsible for collecting existing curb and gutter elevation information prior to commencing the Work.

3.10 BENCHMARKS/VERTICAL CONTROL

A. Benchmarks have been set for survey and construction reference purposes.

B. The Contractor shall protect and transfer these benchmarks as needed to complete the Work.

3.11 HORIZONTAL CONTROL

A. The centerline stationing provided is not based upon physical control points found or established as part of the design.

B. The Contractor shall establish horizontal control as necessary.

PART 4 SPECIAL PROVISIONS

Not Used.

END OF SECTION

SECTION 01810
VIDEO RECORDING

PART 1 GENERAL

1.01 SCOPE

A. Under this Section the Contractor shall furnish all personnel, transportation, recording equipment, power, and materials to produce color video records of existing topography along all pipeline routes and designated haul roads, in designated residences, and as directed.

1.02 SCHEDULE OF WORK

A. Unless otherwise directed in writing by the Engineer, video recording shall be scheduled in conformance with the following:

1. No recording shall be started on any portion of the Work until that portion of the Work is under Contract unless otherwise directed by the Owner.
2. Recording shall not precede excavation for construction by more than three months.
3. Video recording shall be performed only when foliage is visible on trees, except as authorized by the Engineer.
4. Video recording shall not be performed when more than 10% of the ground is covered with snow or leaves, unless authorized by the Owner.

B. Before proceeding with the Work, the video recording Contractor shall consult with the Engineer concerning the following:

1. Scheduling recording to precede construction.

C. All recording shall be completed on a section of Contract before the Contractor starts excavation or places material or equipment in that section.

D. In areas where public utilities are to be relocated or replaced, a second video recording shall be made after the public utility has concluded their work but before the Contractor commences operations.

E. The Owner shall obtain permission for the recording crew to enter private property not included in an easement. The Contractor shall give the Owner sufficient prior notice to obtain the permission.

1.03 DEFINITIONS

A. Video Recording - Zone of Influence - Shall include producing video records as specified herein for the zone of influence. The zone of influence shall be defined as all surface area within street rights-of-way or easements in which project is to be installed or

within areas 50 feet on each side of a proposed utility centerline, whichever is greater, and additional features in contiguous areas as specified or directed.

B. Video Recording of Buildings - Entering - Shall include moving video equipment into buildings or residences (including attached or separate garages) designated by the Engineer for the purpose of recording existing conditions therein.

C. Video Recording of Building - Panels - Shall include video recording of designated panels of buildings. Panel as used herein shall mean the full surface of a room wall, ceiling, or floor or the outer side of a building not viewable in any zone of influence recording.

1.04 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. Provide a minimum of four copies of the video.

PART 2 PRODUCTS

2.01 VIDEO RECORDING

A. Displays - All video shall, by electronic means, display (visible on the playback viewer) continuously and simultaneously generated transparent digital information which shall include the date and time of recording, as well as the corresponding planned station numbers. The date information shall contain the month, day, and year. The time information shall consist of hours, minutes, and seconds, separated by punctuation marks. Below the stationing, periodic transparent alpha/numeric information shall appear. The information shall consist of the name of the project, name of area covered, direction of travel, viewing side, and any other pertinent data.

2.02 VIDEO OUTPUTTING

A. Video recording shall be a digital file format such as MPEG, MP3, MP4, Wave or WMV or other current standard file formats as approved by Engineer.

B. The electronic file organization shall reasonably match the project stationing with file names including the station number and street names.

C. The electronic files shall be stored on a single solid-state memory device, such as a DVD disc or jump/thumb drive, external hard drive. Solid state memory devices shall have a USB for connection to a computer. The memory volume on the storage device shall be adequate to store the electronic video files in an unzipped capacity along with any associated or embedded data files.

2.03 AUXILIARY LIGHTING

A. Auxiliary lighting shall be used wherever necessary to ensure clarity of picture.

PART 3 EXECUTION

3.01 PERSONNEL

A. The Work shall be performed by competent personnel with knowledge of the procedures and methods to produce satisfactory records as specified herein.

3.02 PRODUCTION

A. Recording shall be composed in such a manner that Filming shall, in general, proceed in the direction of the project stationing.

B. Recorded Contents:

1. Video recordings shall be supported by appropriate audio description simultaneous with the visual coverage.

2. All houses or buildings and other readily recognizable objects as required shall be identified visually and audibly in such a manner that they can be referenced to the stationing of the project. Objects selected shall be at intervals not exceeding 100 lineal feet and shall include all houses and buildings identified by house numbers.

3. Within the zone of influence, the recording shall include but not be limited to all sidewalks, driveways, ditches, parkways, lawns, inlets, culvert pipe ends, trees, shrubs, fences, houses, and buildings that could conceivably be affected by the Contractor's operations. The audio shall call attention to existing cracks or uneven areas in walks and driveways, damaged lawns, trees or shrubbery, broken or missing inlet castings, deteriorated fences, and, where feasible, broken or plugged culvert pipes.

4. Within street rights-of-way, the recording shall include but not be limited to all pavement, curbs and inlets, mailboxes, traffic signs, and street signs. The audio shall call attention to damaged mailboxes, signs, curbs and inlet castings. Damaged areas in pavements over proposed project or in pavements scheduled for resurfacing need not be referred to in the audio.

5. Video recording for designated residences shall include documentation of surface conditions inside and outside of the building prior to starting project construction.

C. Control of Picture Quality - The camera carrier shall travel at a low speed to ensure against blur or distortion of the recorded pictures. A maximum rate of 48-feet per minute is recommended.

3.03 OWNER REVIEW

A. As the Video recording work progresses, the Contractor shall deliver completed sections to the Owner and Engineer. The Owner and Engineer will review the recordings and determine if they are acceptable for clarity and coverage. The recording may be rejected

if the picture is of poor quality (i.e., blurred, distorted, too light, too dark, improper color), insufficient coverage, or does not meet specified requirements.

B. The area of rejected recording shall be rerecorded by the Contractor and reinserted in the electronic file in the proper sequence.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

SECTION 01820
VIDEO RECORDING OF UNDERGROUND INFRASTRUCTURE

PART 1 GENERAL

1.01 SCOPE

A. This Section includes the requirements for video documentation of underground facilities.

B. The Contractor shall provide personnel, transportation, recording equipment, power, and materials, to produce color video records of existing or new underground pipelines, structures, designated service pipes and as directed.

C. The Contractor shall provide traffic control, flow control, by-pass pumping and cleaning of underground pipelines, structures and designated service pipe in order to produce video documents.

1.02 SCHEDULE OF WORK

A. Before proceeding with the Work the video recording contractor shall consult with the Engineer concerning the following:

1. Scheduling recording to precede construction.

B. The Owner will obtain permission for the recording crew to enter private property not included in an easement. The Contractor shall provide a schedule of locations 30 days in advance of Work. The Contractor shall coordinate access with Owner and adhere to the schedule.

1.03 DEFINITIONS

A. Video recording shall include producing video records of the area within the underground infrastructure as designated and as specified herein.

1.04 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. Provide a minimum of two copies of the video.

2. Information for the Record:

a. The Contractor shall submit, prior to starting Work, at his own expense, a sample color USB flash or USB hard drives meeting the contract requirements and upon request, must submit at least three letters of reference for the video firm pertinent to the performance and

satisfactory completion of color video projects from various municipalities.

PART 2 PRODUCTS

2.01 VIDEO RECORDING

A. Picture Quality - Video output from camera(s) shall be produced at a minimum of 720 by 480 resolution. Camera(s) shall also produce optimum color imagery with a minimum of 20-foot-candles of illumination.

B. Displays - All video shall, by electronic means, display (visible on the playback viewer) continuously and simultaneously generated transparent digital information which shall include the date and time of recording, as well as the corresponding planned station numbers. The date information shall contain the month, day, and year. The time information shall consist of hours, minutes, and seconds, separated by punctuation marks. Below the stationing, periodic transparent alpha/numeric information shall appear. The information shall consist of the name of the project, name of area covered, direction of travel, viewing side, and any other pertinent data.

2.02 VIDEO OUTPUTTING

A. Video recording shall be a digital file format such as MPEG, MP3, MP4, Wave or WMV or other current standard file formats as approved by Engineer.

B. The electronic file organization shall reasonably match the project stationing with file names including the station number, street names and manhole numbers with distances measured from entry to exit manholes. The system shall start at the lower end of sections of the planned system and proceed upstream, completing one section before starting another.

C. The electronic files shall be stored on a single solid-state memory device, such as a jump/thumb drive, external hard drive. The solid-state memory device shall have a USB for connection to a computer. The memory volume on the storage device shall be adequate to store the electronic video files in an unzipped capacity along with any associated or embedded data files.

2.03 AUXILIARY LIGHTING

A. Auxiliary lighting shall be used wherever necessary to ensure clarity of picture.

PART 3 EXECUTION

3.01 PERSONNEL

A. The Work shall be performed by competent personnel with knowledge of the procedures and methods to produce satisfactory records as specified herein.

3.02 PRODUCTION

A. Recording shall be composed in such a manner that:

1. Filming shall, in general, proceed in the direction of the planned stationing.

B. Recorded Contents:

1. Video recordings shall be supported by appropriate audio description simultaneous with the visual coverage.

2. Readily recognizable objects shall be identified visually and audibly in such a manner that they can be referenced to the planned stationing. Objects selected shall be at intervals not exceeding 100 lineal feet and shall include all house leads/taps identified by measured distance.

3. The recording shall include but not be limited to all inlets, culvert pipe ends, house leads or taps. The audio shall call attention to existing cracks or uneven areas, or missing pipe.

C. Control of Picture Quality - The camera carrier shall travel at a low speed to ensure against blur or distortion of the recorded pictures. A maximum rate of 30-feet per minute is required.

D. Depth of flow in section being inspected shall be no greater than 25%.

3.03 OWNER REVIEW

A. As the video recording work progresses, the Contractor shall deliver completed sections to the Owner and Engineer. The Owner and Engineer shall review the recordings and determine if they are acceptable for clarity and coverage. The recording may be rejected if the picture is of poor quality (i.e., blurred, distorted, too light, too dark, improper color), insufficient coverage, or does not meet specified requirements.

B. The area of rejected recording shall be rerecorded by the Contractor and reinserted in the electronic file in the proper sequence.

PART 4 SPECIAL PROVISIONS

4.01 PRE-CONSTRUCTION SEWER INSPECTION

A. The Contractor shall conduct a video recording of the inspection of the existing sanitary sewers prior to the construction to document existing conditions and locate unknown tap connections on sections of sewers to be surcharged by the work.

4.02 POST CONSTRUCTION SEWER INSPECTION

A. The purpose of the post construction sewer inspection is to confirm the sewer is returned to the Owner in same or better cleanliness following sewer bypassing expected to cause surcharging and likely debris deposition.

END OF SECTION

SECTION 02110
REMOVAL OF STRUCTURES AND OBSTRUCTIONS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes demolition of existing structures and removal of pavement, piping, and equipment necessary to clear space for new construction and/or to rehabilitate existing construction.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Information for the Record:

a. The Contractor shall submit, as specified, a copy of a signed permit from the owner of the property upon which the debris, removed under this Section, will be disposed.

b. Dust and noise control measures

c. Record documents, in accordance with the General Conditions, and photograph or video recording indicates the location of, but not limited to, the following existing, new, and abandoned:

1) Utilities.

2) Mechanical.

3) Electrical.

4) Structural.

5) Any embedded items.

d. Inventory and documentation list for removed and salvaged materials for the Owner.

1.03 QUALITY ASSURANCE

A. Contractor shall execute the Work in compliance with all federal, state, and local codes. Any removal or demolition shall not leave the Owner in violation of any such regulations or codes unless approved by the Owner and Engineer.

1.04 PROTECTION

A. Structures shall be removed in such a manner as not to damage any portions of the existing structure which are to remain in place.

PART 2 PRODUCTS

2.01 FILL MATERIAL

A. Fill material shall be in accordance with Section 02200.

PART 3 EXECUTION

3.01 COORDINATION

A. Demolition work extending beyond the limits as specified, shown on the Drawings, or as required, will be considered unauthorized. The Contractor, at no additional cost to the Owner, shall repair said damage to a condition equal to or better than existed prior to commencement of the Work.

B. Existing structures and equipment which are damaged in appearance or function by performance of demolition work shall be replaced or repaired, at Owner's discretion and to an approved condition, by the Contractor at no increase in Contract Price.

3.02 RESERVED

3.03 RESERVED

3.04 MANHOLES, CATCH BASINS, INLETS AND SIMILAR STRUCTURES

A. Existing manholes, catch basins, inlets, and similar structures designated to be removed shall be completely removed.

B. Manholes, catch basins, inlets, and similar structures designated to be abandoned shall be removed to the specified elevation below the finished subgrade or ground surface. The remaining void shall be filled with special backfill material compacted to 100% optimum density per ASTM D698 or controlled density fill, CDF if permitted by the Engineer. All sewer openings in manholes located on sewer lines that are not to be filled, shall be plugged with 8-inch minimum thickness masonry plug.

C. Sewers designated to remain in service and connected to structures indicated to be removed or abandoned shall be rebuilt through the area with new pipe. Sewer flow shall be maintained between removal and replacement operations. Abandoned sewers shall be sealed and made watertight with approved precast stoppers or masonry bulkheads.

3.05 ABANDONMENT OF PIPE, CONDUIT AND STRUCTURES

A. Specified pipe conduit and structures are to be abandoned by completely filling with a specified controlled density fill material and aggregate stone.

B. Ends of sewer designated to be abandoned shall be sealed with approved masonry mechanical joint plugs.

C. Contractor may need to include fill holes and vent pipes to assure thorough filling. The locations of grout tubes, vents and inspection ports for grout filling pipes to be abandoned shown on the Drawing shall be considered the minimum number. The Contractor may choose to provide more grout tubes, vents, and inspection ports at no additional cost.

D. Quantities of flowable fill material used to fill the conduits shall be monitored continuously during the placement.

E. Bulkheads shall be installed as shown on plans and as needed by the Contractor's method to completely fill the abandoned sewers.

F. Sites disturbed by the abandonment work shall be restored as part of this Work.

G. See Section 02200, 2.05 for CDF material requirements.

3.06 RESERVED

3.07 RESERVED

3.08 EQUIPMENT REMOVAL

A. All equipment, valves, piping, fittings, and miscellaneous steel structures that are removed shall become the property of the Contractor unless designated for salvage. The Contractor shall haul away and dispose of removed materials in a suitable manner.

B. See Drawings for removal of electrical equipment and appurtenances.

C. The Contractor shall replace, at no cost to the Owner, equipment designated to be turned over to the Owner that is lost or damaged.

3.09 RESERVED

3.10 DISPOSAL OF DEBRIS

A. All debris resulting from demolition operations; i.e., broken concrete, masonry, pipe, miscellaneous metal, trees and brush, equipment, etc., shall be trucked from the Work site by the Contractor and disposed of at spoil sites in a legal manner, in full compliance with applicable codes and ordinances.

B. The Contractor shall police the hauling of debris to ensure that all spillage from haul trucks is promptly and completely cleaned up.

3.11 BACKFILLING

A. All trenches, holes, and pits resulting from the removal and abandonment of any structure or obstruction shall be backfilled and compacted in accordance with the requirements of Section 02200.

3.12 RESERVED

3.13 USE OF EXPLOSIVES

A. The use of explosives for the Work of removal of structures and obstructions is PROHIBITED.

3.14 PIPING REMOVAL

A. At the location where pipe removal stops, the remaining pipe end shall be capped. The cap must be pressure tight and restrained from movement due to pressures inside the pipe.

B. Piping removal includes, but not limited to, all hangers, stands, and anchoring devices.

3.15 OPENINGS AND PATCHING

A. The Contractor shall fill all openings created by equipment, piping, and conduit removals.

B. The Contractor shall patch any marred surfaces created by equipment and piping removals.

C. All filling and patching work shall be performed in accordance with the specifications.

D. All anchor bolts shall be removed and holes filled or cut off flush.

PART 4 SPECIAL PROVISIONS

4.01 FRANKLIN STREET PUMP STATION DRY WELL ABANDONMENT

A. The pump station shall be abandoned in accordance with the details provided on the Drawings and as specified herein. The dry well will be filled with the specified CDF material.

B. Equipment to be salvaged is identified herein.

C. Materials and Equipment not specifically identified for salvage may be abandoned in place.

D. The Contractor should consider the dimensional information provided for the existing structures as approximate. Should the Contractor require more accurate measurement during the bid phase, the Contractor (as a Bidder) should make arrangements with the Owner to visit the site and obtain their own measurements.

4.02 SCHEDULE OF SALVAGED MATERIALS

A. The following list of items once removed shall remain the property of the Owner and shall be delivered to the Owner-designated location.

1. Pumps & Motors

2. Valves
3. Floats & Cables
4. Level Transducer (For Reinstallation)
5. Manhole Frame and Lid Castings
6. Guiderails
7. All Steel Components

4.03 FORCE MAIN REMOVAL

A. As shown on the Drawings, existing sanitary sewer, force main, accessories, and appurtenances shall be removed within limits shown on the Drawings or as specified.

B. The removal shall include removal and disposal or aggregate backfill, pipe bedding and control density backfill.

C. Existing pipe removed shall become the property of the Contractor and shall be properly disposed of in accordance with the requirements of this Section.

D. At locations where the pipe removal is terminated, a water-tight sewer plug shall be placed in the end of the pipe to remain.

4.04 SANITARY SEWER & FORCE MAIN ABANDONMENT

A. Select sections of pipe connected to the existing pump station are to be abandoned.

B. These pipes shall be abandoned in accordance with Section 02110, 3.05.

4.05 SEWER AND MANHOLE CLEANING

A. The Contractor is expected to clean all accumulated debris from portions of the collection system used for the bypass pumping operation.

B. Sewers and manholes surcharged by bypassing operations shall be cleaned and television to confirm the condition of these facilities prior to returning the facilities to operation.

C. The Contractor shall be responsible for disposal of debris removed as specified herein.

D. The Contractor shall provide measures to prevent cleaning debris from entering the pumps station where damage could occur to the new equipment.

4.06 SEWAGE DEBRIS REMOVAL

A. The Contractor shall remove accumulated sludge and debris from the wet well and collection system. Any water removed from the wet well shall be decanted back to the sanitary sewer before hauling debris off site.

B. The nature and quantity of debris is unknown. The Contractor shall be required to perform the necessary testing to dispose of debris removed from the wet well or collection system.

C. The Contractor shall properly dispose of debris. The cost of disposal shall be the responsibility of the Contractor.

4.07 SPOIL MATERIAL SITE

A. The Contractor may choose to coordinate a spoil disposal site with the Owner.

B. Spoil material delivered to the Owner's designated site shall meet the Owner's requirements for gradation and debris content.

END OF SECTION

SECTION 02200
EXCAVATION AND BACKFILL

PART 1 GENERAL

1.01 SCOPE

A. This Section includes all excavations and related Work for the construction of the designated structures, pipelines, and other incidental Work.

B. Excavation includes the Work of making all necessary excavations for the construction of all Contract Work; of furnishing, placing, and use of sheeting, shoring, and sheet piling necessary in excavating for and protecting the Work and workers; of doing all pumping and fluming necessary to keep the excavation free from water; of providing for uninterrupted flow of existing streams, treatment plant processes, drains and sewers; of damming and cofferdamming where necessary; of supporting and protecting existing structures, pipes, conduits, sewers, culverts of all types of materials of construction, of supporting and protecting railroad tracks, posts, poles, wires, fences, buildings, and other public and private property adjacent to the Work; of removing and replacing existing sewers, culverts, pipelines, and bulkheads where necessary; of removing after completion of the Work all sheeting and shoring not necessary to support the sides of excavations; of removing and disposing of all surplus excavated material or material under structures that does not meet the soil design bearing capacities; of doing all backfilling, of compacting backfill to limits specified or ordered by the Engineer; and restoring all property damaged as a result of the Work involved in this Contract.

C. The Work includes obtaining and transporting suitable fill material from off-site when on-site material is not available.

D. The Work includes transporting surplus excavated material not needed for backfill at the location where the excavation is made, to other parts of the Work where filling is required, or disposal of all surplus on other sites selected by the Owner.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. Sieve Analysis (ASTM C136) - One test for each material source.

b. Submit a moisture density curve (ASTM D698) for each type of material used for backfill. Test shall be referenced to appropriate sieve analysis test. The maximum dry weight and optimum moisture content shall be indicated.

c. Controlled Density Fill Material - Design Mix and Certified Test Results.

d. Test results for conformance with specified "Compaction Requirements":

1) Retests shall be referenced to the corresponding failing test.

e. Stripped soil and topsoil test per ODOT 659.

2. Information for the Record:

a. When excess excavated material is disposed at locations off the Site, the Contractor shall obtain and submit written permission from the Owner of the property upon which the material is to be placed.

b. Dimensional drawings of shaft and shaft liner construction, layout and related appurtenances and description of shaft construction and removal sequence.

c. Design certifications and calculations for shaft and shaft liner systems sealed by a Professional Engineer in the State where the project is located.

d. Manufacturer's product literature and details of shaft construction and shaft liners and accessories.

e. Shaft information provided as indicated in this Section shall be provided.

f. Details of the proposed method of installation and construction of dewatering wells.

g. Schedule of the proposed sequence of dewatering well construction.

h. Dewatering logs.

i. Submit method for abandoning dewatering well.

PART 2 PRODUCTS

2.01 TOPSOIL

A. Soil stripped from the Site shall consist of loose, friable, loamy topsoil without admixture of subsoil or refuse. It shall be reasonably free from peat, muck, roots, hard clay, coarse gravel, stones, weeds, tall grass, brush, sticks, litter, ground debris and wood products. The stockpiled soil shall be subject to the approval of the Engineer.

B. Topsoil provided shall be in accordance with ODOT 653 and be loose, friable, loamy soil without admixture of subsoil or refuse. In order for the topsoil to be considered loamy the fraction of topsoil, passing a No. 10 sieve, shall contain not more than 40% clay. Topsoil shall contain not less than 4% nor more than 20% organic matter as determined by loss on ignition of oven-dried samples to constant weight at 212 degrees F.

C. Excess material shall be removed from Site, unless directed otherwise by Owner or Engineer.

2.02 SELECT BACKFILL

A. Select backfill shall be clean excavated soil. It shall be free of rock and foreign debris of any kind and shall be tested in accordance with ASTM C136 sieve screen analysis and ASTM D2487 soil classification. The material's use as select backfill shall be approved by the Engineer.

B. Engineer may waive material testing of select backfill. Such waiver shall apply only to the designated location and the source of the select backfill. Such waiver shall not apply to excavated soil from locations not so designated.

2.03 SPECIAL BACKFILL MATERIAL

A. Special backfill material shall conform to ODOT 304.

2.04 AGGREGATE BEDDING MATERIAL

A. Aggregate bedding material shall be well-graded durable crushed gravel, crushed stone or meeting the graduation requirements of ODOT Table 703.01-1.

B. Aggregate bedding material shall be as follows:

1. For PVC, HDPE or plastic pipe diameters 10 inches and less, bedding material shall be No. 8 (nominal size 3/8-inch to sieve No. 8).
2. For PVC, HDPE or plastic pipe diameters over 10 inches, bedding material shall be No. 67 (nominal size 3/4-inch to sieve No. 4) or No. 8 (nominal size 3/8-inch to sieve No. 8).
3. For Ductile Iron Pipe, bedding material shall be sand or manufactured sand.
4. All other aggregate bedding shall be No. 8, No. 67 or No. 57 stone. No. 57 (nominal size 1-inch to sieve No. 4) shall not be used for bedding PVC, HDPE or plastic pipes.

2.05 CONTROLLED DENSITY FILL (CDF) MATERIAL

A. Controlled density fill material shall be a cement base fill material that can be deposited in a fluid state. It shall be composed of portland cement and approved filler material, sand and water. The mixture and shall have a compressive strength of 100 psi minimum and 500 psi maximum:

B. Filler material shall consist of mineral aggregates, slag, or fly ash. Metals, soil, or organic material will not be permitted.

C. The Contractor shall select and submit for approval a mix design with properties to fill the specified annular space (structure and conduit).

2.06 RESERVED

PART 3 EXECUTION

3.01 COORDINATION

A. Test Pits:

1. The Contractor shall perform exploratory test pits as may be necessary or ordered by Engineer in advance of excavation to determine the exact location and elevation of subsurface structures, pipelines, and conduits which are likely to be encountered and shall make acceptable provision for their protection, support, and maintenance in operation. Vacuum excavation (pot hole) may be used if adequate information can be obtained by such method. No additional payment shall be made for test pits.

2. Conflicts with existing utilities not located, as specified, far enough in advance of construction, shall not be considered as a basis for delay claims or additional payment.

3.02 REMOVING AND REPLACING TOPSOIL

A. Removal

1. Excavation for trenches in which pipelines, sewers, conduits and other utilities are to be installed: The Contractor may elect to strip soil and stockpile unless the Contract Documents direct stripping and stockpiling prior to excavation.

2. General excavation, other than trench excavation: The Contractor shall remove, and stockpile the top 4 inches of the existing soils from all areas of construction including, but not limited to, excavation and embankment areas, stockpile sites, construction yard, storage areas, etc.

B. Replacing stockpiled soil and topsoil

1. Trench excavation areas disturbed as a result of trenching operations and which are to be restored with grass or other plantings shall be free of peat, muck, roots, hard clay, coarse gravel, stones, weeks, tall grass, brush, sticks, litter, ground debris and wood products. The surface shall be mechanically conditioned after removal of debris. After surface is prepared, it shall be covered with topsoil or stockpiled soil material to a minimum depth of 4 inches. Topsoils and stockpiled soil material shall meet the requirements specified herein and be tested.

2. General excavation areas which are to be restored with grass or other plantings shall be free of peak, muck, roots, hard clay, coarse gravel, stones, weeks, tall grass, brush, sticks, litter, ground debris, wood products and construction debris including loose stone. The surface shall be mechanically conditioned after removal of debris. After surface is prepared it shall be covered with stockpiled soil and then have a minimum of 4 inches of topsoil placed.

C. The Work shall be in accordance with applicable portions of ODOT items 652 and 653.

3.03 GENERAL EXCAVATION

A. All necessary excavation shall be performed to accommodate the completion of all Contract Work.

B. The Drawings show the horizontal and the lower limits of structures, pipelines, sewers and other utilities. The methods and equipment used by the Contractor when approaching the bottom limits of excavation and when trimming the bottom of the excavation to a smooth surface shall be selected to prevent disturbing the soil below the bottom limits of excavation.

C. Excavation which is carried below the bottom limits shall be classified as Unauthorized Excavation, unless said excavation has been authorized by the Engineer prior to each occurrence.

D. Unauthorized excavation shall be filled with CDF material to the bottom limits. Under circumstances where structural integrity is not a factor, the Engineer may allow the filling of unauthorized excavation with pipe bedding material or special backfill material compacted to 100% density, as specified under compaction requirements.

E. Sheeting, Shoring, and Bracing:

1. The Contractor shall furnish and install adequate sheeting, shoring, and bracing to maintain safe working conditions, and to protect newly built work and all existing adjacent and neighboring structures and utilities from damage by settlement.

2. Sheeting, shoring and bracing shall be arranged so as not to place a strain on portions of completed Work until the construction has proceeded far enough to provide ample strength. Sheeting and bracing may be withdrawn and removed at the time of backfilling, but the Contractor shall be responsible for all damage to newly built Work and adjacent and neighboring structures and utilities.

3. Sheeting, shoring and bracing shall be removed or cut-off at the time of backfilling to avoid problems with finish grade or future excavation.

F. Construction Sheeting Left in Place:

1. The Contractor shall furnish, install, and leave in place, construction sheeting and bracing when specified or when indicated or shown on the Drawings.

2. Construction sheeting and bracing, placed by the Contractor to protect adjacent and neighboring structures and utilities, may be left in place if desired by the Contractor. All such sheeting and bracing left in place, shall be included in the cost for excavation.

3. Any construction sheeting and bracing which the Contractor has placed to facilitate his work may be ordered, in writing by the Engineer, to be left in place. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating an obligation on his part to issue such orders. Failure of

the Engineer to order sheeting and bracing left in place shall not relieve the Contractor of his responsibility under the Contract.

G. Removal of Water:

1. The Contractor shall at all times during construction provide and maintain ample means and devices with which to remove promptly and dispose of properly all water entering the excavations or other parts of the Work and shall keep said excavations dry until the structures to be built or pipelines to be placed therein are completed. No water shall be allowed to rise over or come in contact with concrete or masonry until the concrete and mortar has attained a satisfactory set, except in cases where the concrete has been tremied into place with the approval of the Engineer. Water shall not be allowed to rise above the bottom of the bedding stone prior to placing pipe. In waterbearing sand, well points and/or sheeting shall be supplied, together with pumps and other appurtenances of ample capacity to keep the excavation free of water and in compliance with government regulations.

2. The Contractor shall dispose of water from the Work in a suitable manner without damage to adjacent property or structures and in compliance with all regulations.

3.04 TRENCH EXCAVATION

A. Excavation for trenches in which pipelines, sewers, conduits and other utilities are to be installed shall provide adequate space for workers to place and joint the pipe properly. The trench shall be kept to a minimum width. The width of trench at the top of the pipe shall comply with the limits specified or shown on the Drawings.

B. Excavation shall be to the depth necessary for placing aggregate bedding material under the pipeline, sewer, conduits and other utilities as shown on the Drawings. If over excavation occurs, the trench bottom shall be filled to grade with compacted aggregate bedding material.

C. The amount of trench open at any one time in advance of completed Work shall be limited to the minimum necessary for conducting laying operations.

D. In general, backfilling shall begin as soon as the pipeline, sewer, conduits and other utilities are in a condition to receive it and shall be carried to completion as rapidly as possible. New trenching shall not be started when earlier trenches need backfilling or the surfaces of streets or other areas need to be restored to a safe condition.

3.05 EXCAVATION OF UNSUITABLE MATERIAL

A. Unsuitable materials existing below the Contract bottom limits for excavation shall be removed as required by the Engineer. The Engineer may rely upon the independent laboratory retained on this Project when determining unsuitable soil conditions, removal and backfill. Such excavation shall be conducted at a time when the Engineer

and independent laboratory are present and shall not exceed the vertical and lateral limits prescribed by both.

B. The voids left by removal of unsuitable material shall be filled with special backfill, pipe bedding material, or CDF material as listed in Part 4 or as prescribed by the independent laboratory and as approved and ordered by the Engineer. Special backfill or pipe bedding shall be installed as described in this Section and in general shall be compacted to 100% density as specified under compaction requirements.

3.06 DISPOSAL OF UNSUITABLE AND SURPLUS MATERIAL

A. All excavated materials which are unsuitable for use in backfilling trenches or around structures, and materials excavated that are in excess of that required for backfilling and for constructing fills and embankments as shown on the Drawings, shall be disposed of by the Contractor at his expense and at sites provided by the contractor.

B. No surplus excavated material of any class shall be deposited in any stream or watercourse or be dumped on public property without the consent of the Owner. All spoil areas shall be left smooth, level, with drainage to a water course and proper erosion and runoff control shall be used.

3.07 BACKFILL AND COMPACTION

A. Pipe and Conduit Bedding - Unless otherwise directed, pipe, conduits and other utilities shall be installed in specified aggregate bedding material as shown on the Drawings and as specified.

B. Backfilling Under Existing Pipeline, Sewer, Conduits and Other Utilities - Where it is necessary to undercut or replace existing utility conduits and/or service lines, the excavation beneath such lines shall be backfilled the entire length with aggregate bedding material tamped in place in 6-inch layers to the required density. The aggregate bedding shall extend outward from the spring line of the conduit a distance of 2-feet on all sides and thence downward at its natural slope.

C. Backfilling with Selected Backfill - Unless otherwise specified or directed, material excavated in connection with the Work may be used for backfilling and other filling purposes, if it meets all requirements given elsewhere in this specification for selected backfill. No material shall be used for backfilling that contains stones, rock, or pieces of masonry greater than 12 inches, frozen earth, debris, earth with an exceptionally high void content, organic material, or marl. No large pieces of rock or masonry shall be deposited closer than 24 inches from the completed outside surface of any structure or pipe.

D. Backfill Immediately - All trenches and excavations shall be backfilled immediately after completion of construction therein, unless otherwise directed by the Engineer. Under no circumstances shall water be permitted to rise in unbackfilled excavation during construction or after pipe has been placed.

E. Backfilling around and over structures, pipelines, conduits and other utilities comprising the Work shall be carefully done by hand and tamped with suitable tools of approved weight when within 2 feet of structures, pipeline, conduit and other utilities. Selected backfill or, where specified, shown on Drawings, or ordered by the Engineer, special backfill material shall be used in this area. The material shall be placed in uniform layers not exceeding 6 inches in depth up each side. Each layer shall be placed, then carefully and uniformly tamped to the specified density so as to eliminate the possibility of lateral displacement of pipe or structure.

F. Backfilling may be done by machinery after the backfill has been placed and compacted beyond 2 feet horizontally of structures, pipelines, conduits and other utilities and to a minimum depth of 1 foot above the tops of any buried structures, pipelines, conduits, and other utilities. The backfill material shall be deposited in horizontal layers, not thicker than one foot, and each layer shall be thoroughly compacted to the specified density by approved methods before a succeeding layer is placed. In no case, will backfill material from a bucket be allowed to fall directly on a structure or pipe and in all cases the bucket must be lowered so that the shock of the falling material will not cause damage.

G. Backfilling Under Pavement and Walks - Where existing or new pavement, driveway, parking lot, curb and gutter, or walk is over an excavation, special backfill material shall be used to backfill the entire excavation from the bedding to surface. The material shall be placed and compacted to the required density in accordance with one of the following methods:

1. The backfill material shall be deposited in 6-inch horizontal layers and each layer shall be thoroughly compacted to the proper density by approved compaction method before a succeeding layer is placed.

2. No method of compaction which alters the gradation of the special backfill material or prevents compaction testing by standard testing methods shall be used.

H. Backfilling with Controlled Density Fill Material (CDF) - Where called for on the Drawings, specified, or ordered, CDF material shall be used in lieu of special backfill or bedding material specified herein. Before placing CDF material, the Contractor shall take required measures to protect the Work against flotation.

I. Backfilling Under Structures - Where structural slabs, mats or footings are to be placed on a backfilled area, special backfill material shall be used unless otherwise noted on the Drawings. The backfill material shall be placed in 6-inch horizontal layers and each layer shall be thoroughly compacted to the specified density by approved methods before a succeeding layer is placed. Where backfill is to be placed on undisturbed side slopes steeper than one vertical to six horizontal, steps shall be formed into the slope before each layer of the backfill is placed. These steps shall be cut vertically at no more than 2-feet intervals and shall have a horizontal dimension of not less than 3-feet.

J. Prior to backfilling under structures the natural subgrade shall be evaluated at regular intervals in each direction by the independent testing laboratory to determine that the

subgrade can obtain the design bearing capacity given by the "Structural Design Data" table on the Drawings. If the subgrade cannot obtain the design bearing capacity then the testing laboratory shall submit a remedy to the Engineer for approval and for the Contractor to perform.

K.

3.08 COMPACTION REQUIREMENTS

A. In areas to be filled, after the top soil is stripped, then the undisturbed subgrade shall be compacted to not less than 100% of maximum dry density per ASTM D698 (Standard Proctor) prior to placing of fill.

B. Backfill placed under areas receiving concrete slabs, mats, footings, or within the interior of buildings shall be compacted to not less than 100% of maximum dry density per ASTM D698.

C. Backfill placed around structures where other structures, pipelines, or slabs are to be constructed shall be compacted to not less than 100% of maximum dry density per ASTM D698.

D. The material used to construct embankments and fills in locations other than under pavements, walks, structures, or slabs and around and over pipelines, shall be compacted to not less than 95% of maximum dry density per ASTM D698.

E. All other backfill, including backfill around and over pipelines, and backfill around structures not covered in Paragraphs B. and C. above, shall be compacted to not less than 95% of maximum dry density per ASTM D698.

F. The bottom of excavations upon which concrete slabs or structures are to be placed shall be compacted to obtain 100% maximum dry density per ASTM D698 in the top 12 inches.

G. All soil subgrade which will provide bearing support for pavements or curbs, shall be compacted to a width of 6 inches beyond the back of curb and to a depth of 12 inches below the bottom of excavation to a density of not less than 100% of maximum dry density per ASTM D698. All fill below the subgrade shall be compacted to not less than 98% of maximum dry density, unless specified otherwise.

H. Subgrade under the driveways and walks shall be compacted to a depth of 6 inches below the subgrade surface to density of not less than 100% of the maximum dry density determined by ASTM D698.

I. Subgrade under structures shall be compacted to a depth of 12 inches below bottom of excavation surface to a density of not less than 100% of the maximum dry density determined by ASTM D698.

3.09 COMPACTION TESTS

A. Trenches and excavation around structures shall be backfilled and consolidated in layers, as specified, to the existing ground surface. Initial test series for each type of

backfill material shall be continued until the method of consolidation employed has proven to attain the required compaction. Any change in the proven method of consolidations will require additional testing and field verification of compaction.

B. Subgrade below pavements, curbs, sidewalks, and structures shall be consolidated as specified. Compaction tests shall be performed to verify specified consolidation.

C. Subsequent tests or series of tests shall be in locations and at depths ordered by the Engineer.

3.10 RESERVED

3.11 RESERVED

3.12 RESERVED

PART 4 SPECIAL PROVISIONS

4.01 FIELD TESTING (MINIMUM REQUIREMENTS)

A. The laboratory shall perform the following field tests:

1. Trench Backfill - One test for every 200 cubic yards of backfill material.
2. Subgrade Compaction - One test for every 300 square yards of subgrade.
3. If directed by the Engineer, additional tests shall be performed for any of the above.

END OF SECTION

SECTION 02550
SANITARY SEWERS AND STORM SEWERS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes furnishing and installing sanitary sewers and storm sewers.

B. Reconstruction of existing sewers, house connections, and catch basin leads shall be in conformance with requirements of this Section.

C. This Section shall include furnishing and installing all required pipe, bends or beveled pipe, tees, wyes, tee manhole base pipes, bulkheads and stoppers, jointing material, granular material for pipe bedding, concrete used for encasement or bedding, making watertight connections to existing and new sewers and existing manholes, catch basins and inlets, cleaning and testing sewers, removing temporary bulkheads, and other work incidental to the sewer installation unless specifically included under other Items.

D. Additional product requirements are specified in Section 01350.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

   a. Manufacturer's Shop Drawings indicating pipe and joint materials, physical dimensions, and joint details for each size, type, and class of pipe, fittings and specials furnished for the project compliance with specified standards.

   b. Manufacturer's concrete design strength and reinforcing steel for RCP.

2. Information for the Record:

   a. Manufacturer's certification indicating that the pipe and joints meet specifications for each production run for each size, type, and class of pipe furnished. The Engineer may request test results to verify certification. Certification documents shall be according to the Source Quality Control of this Section.

   b. Manufacturer's design calculations to verify basis of design.

   c. Manufacturer's installation instructions.

   d. The laboratory shall submit test certifications of pipe ordered tested under "Field Quality Control," of this Section.

PART 2 PRODUCTS

2.01 SOLID WALLED PIPES

A. Polyvinyl Chloride Pipe (PVC):

1. For pipe 15-inch diameter and smaller: Pipe, fittings, and jointing systems shall conform to ASTM D3034, except that the standard dimension ratio of the outside diameter of the pipe to wall thickness shall not exceed 35.

2. For pipe 18 inch thru 24-inch diameter: Pipe, fittings, and jointing systems shall conform to ASTM F679 with a SDR 26 or PS 115 wall thickness.

3. Joint systems shall be elastomeric seal (gasket) type. Seals shall conform to ASTM F-477 requirements. Joint materials and testing shall conform to ASTM D3212 requirements.

4. All service connections shall be made using a wye and a bend. Tees shall be used only as directed by the Engineer. Tees and wyes shall be diecast, or factory fabricated. All service pipe shall be SDR 35.

2.02 RESERVED

2.03 RESERVED

2.04 ACCESSORIES

A. Non-shrinking Mortar Material:

1. Material for non-shrinking mortar used in pointing joints shall be Sauereisen F-100 Grout as manufactured by Sauereisen Cements Co., Pittsburgh, Pennsylvania; Five-Star Grout as manufactured by US Grout Corp., Old Greenwich, Connecticut; or equal.

B. Flexible Pipe Repair Couplings:

1. Flexible repair couplings shall be made of elastomeric polyvinyl chloride boot with series 300 stainless steel shield and clamps. Couplings shall be Strong Back RC series as manufactured by Fernco Joint Sealer Co., Ferndale, Michigan; Logan Clay Pipe Co., Logan, Ohio; Mission Clay Products Corp., or equal.

C. Flexible Watertight Joints:

1. Flexible watertight joints used in connecting to existing sewers shall be a “boot” type sealed to the pipe wall with an internal expanding band and around the connecting pipe with an external adjustable band. Other types of applicable flexible joints may be submitted for approval.

D. Granular Pipe Bedding Material:

1. Granular pipe bedding material shall be as specified in Section 02200.

2.05 REPLACEMENT DRAINS, SEWERS AND APPURTENANCES

A. Vitrified clay pipe sanitary sewers removed or damaged in completed the Work shall be replaced using pipe and joints as specified in this Section. Connections to existing sewers shall be as specified in this Section.

B. Manholes, catch basins, and inlets removed or damaged under these Items shall be replaced in conformance with applicable Drawings and Specifications.

2.06 SOURCE QUALITY CONTROL

A. Pipe Manufacturer's Certification:

1. The pipe manufacturer's certificate shall state that the materials have been sampled and tested in accordance with the provision for and meet the requirements of the designated specification and shall be signed by an authorized agent of the seller or the manufacturer.

2. A test results report shall accompany that manufacturer's certificate. The report shall compare test results to Specification requirements. Test specimens shall be selected in conformance with the designated specification, except that no less than two tests shall be made for each production run of each size, type, and class of pipe furnished, and further, that in case tests are unsatisfactory, additional tests shall be made to the maximum number in the referenced ASTM Specification.

PART 3 EXECUTION

3.01 RESERVED

3.02 PREPARATION OF TRENCH

A. Trench excavation shall conform to requirements of Section 02200.

B. For rigid pipes the width of trench at the top of pipe shall be as shown in the Trench Detail on the Drawings.

C. Unless otherwise indicated minimum trench widths for flexible pipes shall meet the requirements of ASTM D2321 and the Trench Detail shown on the Drawings.

D. Unless otherwise indicated all sewer trenches shall be excavated below the proposed pipe invert as required to accommodate the depths of bedding material as shown on the Drawings and specified herein.

3.03 RIGID PIPE INSTALLATION

A. Pipe trenches shall be excavated to the depth indicated on details to provide adequate depth of bedding and the pipe shall be placed and supported on bedding material the full length of the barrel. Bedding material shall then be placed 4-inch maximum depth along both sides of the pipe and tamped firmly under the pipe haunches. Additional

bedding material shall be placed and compacted in 6 inch layers to the height shown on the Drawings or as directed. Hand tampers shall be used for installing bedding material around pipes smaller than 36-inch diameter and mechanical hand tampers shall be used around pipes 36-inch diameter and larger unless otherwise directed by the Engineer. The remainder of the trench shall be backfilled as specified and called for on the Drawings.

B. Concrete bedding and encasement in lieu of bedding material shall be installed as shown on the Drawings or specified.

C. The laying of pipe in finished trenches shall be commenced at the lowest point, with the bell end or groove end laid upgrade. Pipe shall be laid with ends abutting and true to line and grade. They shall be carefully centered to form a sewer with a uniform invert of line and grade shown on the Drawings.

D. Pipe shall be laid to lines and grades by use of a laser beam and checked in conformance with Section 01800. Pipes installed more than 0.04 feet above or below specified elevation shall be removed and reinstalled to grade.

E. Where holes are cast in concrete pipe for handling, they shall be completely filled with non-shrinking mortar after the pipe is placed. A metal disc of proper size may be inserted near the bottom of the hole to retain the mortar until hardened. Wood plugs or rocks intended to plug the hole for retention of the mortar will not be permitted.

3.04 RESERVED

3.05 RESERVED

3.06 PIPE JOINTS

A. O-Ring and Chemically Welded Joints - Pipe jointing surfaces shall be clean and dry when preparing surfaces for joining. Lubricants, primers, adhesives, etc., shall be used as recommended by the pipe or joint manufacturer's specifications. The jointing materials or factory fabricated joints shall then be placed, fitted, joined, and adjusted in such a manner as to obtain a watertight joint. Trenches shall be kept water-free and as dry as possible during bedding, laying, and jointing. As soon as possible after the joint is made, sufficient backfill material shall be placed along each side of the pipe to prevent movement of the pipe from any cause.

B. Flexible Plastic Gasket Joints - Materials used for gaskets shall be as specified in this Section. Cross section size of gaskets and method of installation shall conform to the manufacturer's recommendations.

3.07 CONNECTIONS TO EXISTING SEWERS

A. Unless indicated otherwise new pipe connections through the side of existing sewers shall be made as follows:

1. Vitrified clay pipe, plain concrete pipe, and asbestos cement pipe, 15-inch diameter and smaller, and larger diameter at the option of the Contractor, shall be connected by removing a section of the existing sewer and inserting connecting fittings using specified flexible repair couplings.
2. Reinforced concrete pipe and larger sizes of asbestos cement pipe and plain concrete pipe, unless otherwise shown on the Drawings, shall be connected by coring the existing sewer pipe wall and inserting a flexible watertight joint to receive the new pipe.
3. Polyvinyl chloride pipe, ABS pipe, and ABS truss pipe shall be connected in conformance with the manufacturer's recommendations as approved by the Engineer.
4. Connections shall be made in conformance with the jointing materials manufacturer's recommendations and as directed by the Resident Project Representative.

3.08 FIELD QUALITY CONTROL

A. The Resident Project Representative may select one sample of pipe on the job site of each production run of each size and type of pipe to be tested by the Contractor's laboratory. The Contractor shall furnish the first test piece or pipe core and any additional samples required because of failures. The Contractor shall pay for tests on the first sample. Should the sample fail to meet specifications, retests shall be conducted by the Contractor's laboratory in conformance with the specifications and shall be at no additional expense to Owner.

B. Deflection of PVC, PE and ABS Composite Piping Sewers:

1. Vertical Ring Deflection - Before final acceptance of sewer lines, all sections of sewer pipe 8 inches and larger specified diameter shall be measured for vertical ring deflection by the Contractor and witnessed by the Resident Project Representative. Maximum deflection under full load shall not exceed 5% of the ASTM designated average inside diameter as determined by the laboratory for the specified piping.
2. Failures - Should a pipe exceed the allowable deflection; the Contractor shall replace those pipes and retest the section.
3. Equipment used in testing shall be go-no-go pull through gauges of a type approved by the Engineer. A metal or plastic gauging ring of diameter equal to 95% of the specified average inside pipe diameter shall be furnished with each gauge.
4. The Contractor shall furnish testing equipment and personnel and perform the required tests. Tests must be witnessed by the Resident Project Representative.
5. Use of mechanical pulling devices is not permitted.

6. Deflection testing shall not be performed until the completed and accepted trench backfill has been in place for at least 30 days.

7. Individual sections of pipe may be rejected at any time because of defective joints, dimension variations, fractures, cracks, chips, or blisters exceeding the permissible tolerances.

8. Rejected pipe shall be so marked with a lumber crayon or paint and shall be removed from the job site before the end of the following work day.

3.09 RESERVED

3.10 LOW PRESSURE AIR ACCEPTANCE TESTS

A. Where approved by the Engineer, the Contractor may perform low pressure air acceptance tests in lieu of infiltration or exfiltration tests for pipes 24 inches in diameter or smaller. Test shall be made in accordance with ASTM F1417-Plastic Gravity Sewer Lines.

1. If the air pressure required for the test is greater than 5.0 psig, the low-pressure air acceptance test shall not be used.

B. The Contractor shall furnish all equipment, materials, and labor, and conduct the tests under observation of the Resident Project Representative.

C. Safety:

1. The air test may be dangerous if the line is improperly prepared. All plugs shall be installed and braced in such a manner to prevent blowouts. No one shall be allowed in manholes during testing.

2. Pressurizing equipment shall include a regulator set at the maximum pressure.

D. Line Preparation:

1. Sewers to be air tested shall be prepared and inspected as specified herein for infiltration and exfiltration tests.

2. Where porous pipe materials are used, the pipe walls may be wetted to temporarily reduce the porosity of the material.

3. All pipe outlets shall be plugged, braced, and the joints restrained adequately to prevent blowouts.

E. Test Procedure:

1. Low pressure air shall be slowly introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure of any groundwater above the invert of the pipe.

2. When a constant pressure of 4.0 psig greater than the average back pressure of any groundwater above the pipe is reached, the air supply shall be throttled to

maintain that internal pressure for at least 2 minutes to permit temperature equalization.

3. When temperatures have been equalized and the pressure stabilized at 4.0 psig greater than the average back pressure of any groundwater above the pipe, the air supply shall be shut off or disconnected.

4. Decrease the pressure in the sealed line until the continuous monitoring pressure gauge reads 3.5 psig greater than the average back pressure of any groundwater above the pipe. When this pressure is reached, timing shall commence with a stop watch.

5. Determine the time, as shown on the stop watch, required for the pressure in the sealed line to drop 1.0 psig.

F. Test Method ASTM F1417-Plastic Gravity Sewer Line:

1. Low pressure air test method shall be the Time-Pressure Drop Method.

2. The pressure used in the test shall be the stated pressure plus the average back pressure of any groundwater above the pipe.

3. The time required for the pressure in the test section to drop 1.0 psig shall be measured using a stop watch. If the time is less than the time determined from ASTM F1417, the section fails. The table below has been reprinted from ASTM F1417 for Contractor's information.

Pipe Diameter, Inches	Minimum Time, Min.: Sec.	Length for Minimum Time, Feet	Time for Longer Length, Sec. (L=Ft)
6	5:40	398	0.854 L
8	7:34	298	1.520 L
10	9:26	239	2.374 L
12	11:20	199	3.418 L
15	14:10	159	5.342 L
18	17:00	133	7.692 L
21	19:50	114	10.470L
24	22:40	99	13.674L

Note: Minimum time applied to all lengths less than or equal to the length shown. For more information, see ASTM F-1417, Table 1.

PART 4 SPECIAL PROVISIONS

4.01 PIPE SCHEDULE

A. The following letter designations are used in the Piping Schedule:

Material Designation:
DIP - Ductile Iron Pipe
PVC - Polyvinyl Chloride
RCP - Reinforced Concrete Pipe

B. Sanitary Sewer Schedule

Size	Thickness Class	Material	Spec Section	Remarks
12” & less	SDR35	PVC	2.01	Open cut sewer construction

C. Schedules are not guaranteed to be complete. All piping shown on the Drawings or specified shall be furnished and installed by the Contractor whether or not listed in the above schedule.

4.02 TESTING

A. The requirements of leakage and deflection testing of new sanitary sewer pipe installed under this Work are waived.

END OF SECTION

SECTION 02551
PRECAST CONCRETE STRUCTURES

PART 1 GENERAL

1.01 SCOPE

A. This Section includes furnishing and installing precast concrete structure sections of types and at locations shown on the Drawings and scheduled.

B. This Section includes removing existing structures, additional excavation to widen and deepen trenches for structures construction, furnishing and installing concrete of indicated strength, portland cement mortar, reinforcing steel, precast concrete integral base sections, bottom riser sections, transition sections, and riser sections, flat slab tops and grade rings, pipe opening with flexible pipe connections, pipe for drop connections, manhole steps, manhole frames and covers, plugging lifting holes, pointing joints, forming channels through bottoms, making watertight connections to new and existing sewers, and other work incidental to construction and testing.

C. Additional product requirements are specified in Section 01350.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. Manufacturer's Shop Drawings indicating physical dimensions, joint details, reinforcing steel, and layout for each size and type of structure(s) components furnished for the project.

b. Manufacturer's certification indicating that the precast structure components and joints meet specifications for each production run for each size and type furnished.

2. Information for the Record:

a. The Engineer may request test results to verify certification. Certification documents shall be according to the Source Quality Control of this Section.

PART 2 PRODUCTS

2.01 MATERIALS OR PRODUCTS OR EQUIPMENT

A. Precast concrete sections, integral base sections, and flat slab tops shall be designed by an Engineer licensed in the state of the project and conforming to ASTM C913 and ASTM

C890. The design shall be adequate to support traffic or non-traffic loads as specified in Part 4.

B. All joints in the walls and bottom of precast tanks and vaults shall be tongue and groove type with a preformed butyl rubber joint sealant placed in the joint prior to assembly of the joint. This joint material shall provide a permanent flexible non-shrinking watertight seal and shall meet the requirements of ASTM C990. After assembly of the joint, a 12-inch-wide band of permanent flexible water barrier wrap shall be applied to the exterior surfaces centered on all wall joints and any buried top slab joints. This barrier wrap shall meet the requirements of ASTM E1745, C877, and C990. The barrier wrap shall be bonded to the concrete with a brush or roller applied adhesive surface primer formulated for use with the barrier wrap material.

C. There shall be no opening or penetration within 6 inches of any joint on precast structure. Section heights shall be adjusted as required.

D. Precast integral base and top sections shall be of monolithic construction.

E. Holes required in the structure shall be cast and formed during fabrication. Field cutting of holes is not permitted without Engineer's approval.

F. Additional concrete reinforcing steel and dowels shall be installed as shown on drawings to resist the buoyant forces. Concrete shall be as specified below.

2.02 ACCESSORIES

A. Manhole Steps - Manhole Steps shall be of polypropylene plastic reinforced with a 1/2-inch No. 60 grade reinforcing rod. Steps shall be M. A. Industries Model PS-1, or equal.

1. Specified manhole steps shall be factory installed to provide a continuous ladder of 16-inch Center-to-Center rung spacing. Steps shall be placed in the forms and cast in wall or placed immediately after removal from casting and carefully mortared in place with non-shrink mortar to insure a watertight joint. Step installation shall be in compliance with OSHA regulations. If the outer surface of the wall is pierced the patch shall be completely covered with a bituminous sealer.

B. Manhole frames and covers shall be as shown on the Drawings and in conformance with requirements of Section 05540.

C. Floor doors shall be the size and type as shown on the Drawings and as specified in Section 08320.

D. Mortar:

1. Mortar used for the structures herein specified shall conform to ASTM C270 Type S, containing no masonry cement. The mortar shall be composed of one-part portland cement to two parts sand by volume.

2. Non-shrinking Mortar - Materials for non-shrinking mortar shall be Sauereisen F-100, Five-Star, or equal.

E. Cast-in-Place Concrete:

1. All cast-in-place concrete used for forming channels in structure bottoms shall be Class A as specified in 03305.

2. All concrete used for supporting precast concrete structure bases shall be Class B as specified in 03305.

F. Flexible Joints - Joints for precast pipe openings shall be “Res-Seal” type as manufactured by Price Brothers Company, “Kor-n-seal” as manufactured by National Pollution Control Systems, Inc., or equal.

G. Wall Sleeves shall be used as indicated on the drawings and in conformance with Section 15210.

PART 3 EXECUTION

3.01 COORDINATION

A. Location and type of precast concrete structure installed shall be as shown on the Drawings or directed.

B. Construction shall be in conformance with details shown on the Drawings and as specified.

C. Excavation for structure construction shall be prepared as specified, shown on the Drawings and as directed in Section 02200.

3.02 INSTALLATION OF INTEGRAL BASE SECTIONS

A. Base sections shall be paced on a minimum 6-inch thick bedding material under the entire area of the structure base. Bottom sections placed on bedding shall be a minimum of 6 inches thick. Base section shall be level and plumb. Structures that are not plumb and level shall be removed and reset as specified.

3.03 FORMING STRUCTURE BOTTOMS

A. The bottoms of all structures shall be channeled or fillets placed as shown on the drawings to conduct flow in the planned direction.

3.04 PRECAST CONCRETE RISER SECTIONS

A. Sections 32 inches in height or less shall be incorporated into the structure immediately below the top.

B. Structure joints shall be pointed and lifting holes filled with non-shrink nonmetallic mortar.

3.05 INSTALLATION OF CASTING FRAMES AND COVERS

A. Frames and covers shall be installed to grades shown on the Drawings or as directed.

B. Adjustment of castings shall be made using specified precast grade rings and portland cement mortar joints or preferred bitumen seals.

C. Each pressure tight manhole casting shall be anchored in place using four 5/8-inch stainless steel bolts with nuts as detailed on the Drawings or directed.

D. The maximum depth of adjustment below any manhole casting shall be 16 inches and the minimum depth of adjustment shall be 4 inches.

E. In concrete pavement, separate frame from pavement with 1/2-inch-thick premolded mastic joint material extending from the base of the frame to the top of the frame.

3.06 FLOOR DOORS

A. Contractor shall coordinate with precast manufacturer to have floor doors cast as an integral part of the top section with proper coatings at metal/concrete interface. Provide drain piping as needed for floor door channels.

3.07 FIELD QUALITY CONTROL

A. Field Inspection:

1. Individual sections may be rejected at any time because of defective joints, dimension variations, fractures, cracks, honeycombing, chips, or blisters exceeding the permissible tolerances as set by ASTM C913.

2. Rejected sections shall be so marked with a lumber crayon or paint and shall be removed from the job site before the end of the following work day.

B. Correction of honeycombing, chips, blisters and filling lifting holes shall not be performed without prior approval from the engineer.

C. Field cutting of the precast sections shall not be performed without prior approval from engineer.

PART 4 SPECIAL PROVISIONS

4.01 ACCESSORIES

A. Flexible Joints - Joints for precast pipe openings shall be “A-LOK X-CEL” as manufactured by A-LOK Products, Inc., “Kor-n-seal” as manufactured by National Pollution Control Systems, Inc., or equal in accordance with ASTM C923.

B. Pipe for Manhole Drops - Pipe for manhole drops shall conform to specifications of Section 02550 for the required size and type shown on the Drawings.

C. Joint Wrap - Polyolefin backed exterior joint wrap used to cover the exterior side of joints shall be ConSeal CS212; Riser Wrap by Pipeline Seal & Insulator, Inc. or equal. Minimum width shall be 12 inches. Joint wrap shall include the use of brush or roller applied adhesive surface primer formulated for use with joint wrap. Seal shall meet the requirements of ASTM E1745, C-877, and ASTM C990.

D. Chimney seal shall be applied to the exterior of all manholes and shall cover the joint at iron casting, adjusting ring and lap over manhole riser/top section. Seal shall be HDPE heat shrink as manufactured by Pipeline Seal & Insulator, Inc. (Riser-Wrap) and CCI Pipeline System (Wrapid Seal), or equal.

E. Chimney seals which are installed on the interior of manholes will not be acceptable.

F. The specified accessories shall be used for existing structures to be modified as well as new structures included in this project.

4.02 XYPEX ADDITIVE

A. Contractor to provide crystalline waterproofing additive to precast concrete structure as indicated on the drawings and as specified herein (Xypex Admix C-500 or C-1000).

B. Concrete waterproofing system shall be of the crystalline type that chemically controls and permanently fixes a non-soluble crystalline structure throughout the capillary voids of the concrete. The system shall cause the concrete to become sealed against the penetration of liquids from any direction, and shall protect the concrete from deterioration due to harsh environmental conditions.

C. The manufacture of the crystalline water proofing shall provide the type of material and the dosage rate for the application. Admix must be added to concrete mix at time of batching. The actual dosage in the mix design shall be certified at the time of application.

D. Manufacturer shall coordinate with the concrete batch facility and other admixture suppliers to ensure compatibility with the concrete mix design, other admixtures and concrete properties. The addition of the crystalline water proofing shall not reduce the concrete strength or compromise the ASTM specifications or other quality standards governing the concrete mix.

E. Concrete containing Xypex Admix shall be moist cured in accordance with ACI Reference 308, “Standard Practice for Curing Concrete”.

4.03 WET WELL PROTECTIVE COATING

A. Contractor to provide a multi-component (layer) flexible-sealant liner to both new and existing precast concrete wet wells as indicated on the Drawings and as specified herein. The liner is intended to provide infiltration resistance and corrosion protection. Acceptable liner products are as follows:

1. CCI Spectrum, Inc. SpectraShield Liner System – SpectraShield Foam
2. OBIC Products – OBIC Armor 1000F
3. Approved equal.

B. The protective coating system shall consist of a spray-able, solvent free modified polymer or VOC free two component polyurea that chemically and permanently fills voids in concrete and damaged bricks within the precast structure. The system should cause the precast concrete to become sealed against the penetration of liquids from any direction

and shall protect the precast concrete from deterioration due to corrosive wastewater environments.

C. The manufacturer of the sealant liner shall provide the type of material and dosage for the application. The sealant equipment provided by the manufacturer shall be specifically designed for the actual dosage amount to apply the liner system.

D. Protective Coating Installation Procedure:

1. The Contractor shall monitor the atmosphere for hydrogen sulfide, methane, low oxygen or other gases. The Contractor shall provide approved flow control equipment, surface preparation, and installation and testing equipment.

2. Preparation and Cleaning of Interior Surfaces - The Contractor shall clean all interior surfaces to be free of grease, loose bricks, mortar, unsound concrete and other materials by water blasting, wet or dry sandblasting, acid washing or other mechanical methods as approved by the Engineer. The Contractor may be required to employ degreasers or concrete cleaners to properly prepare the concrete interior surface to receive the primer and liner material. Following the cleaning, the interior surfaces shall be thoroughly rinsed to remove any residue from the cleaning operation. The precast concrete interior surface shall be dried and at a proper temperature to receive the primer and liner material.

3. Concrete Patching - all non-leaking holes, missing bricks, missing mortar, unsound concrete, delaminated concrete, cracks and spalls shall be repaired, repointed or filled using a pre-mixed, non-shrink, cement based patching mortar consisting of hydraulic cement, graded silica aggregates, polymer, special plasticizing and accelerating agents formulated specifically for vertical or overhead use. The concrete patching material shall contain no chlorides, gypsums, plasters, iron particles, aluminum powder or gas forming agents and shall not promote corrosion of steel that the grout material may come into contact with.

   a. Set time - less than 30 minutes per ASTM C191.

   b. One hour compressive strength - minimum of 200 psi per ASTM C109.

   c. Ultimate compressive strength - minimum of 5,000 psi per ASTM C109.

   d. Bond strength - minimum of 1,700 psi per ASTM C882.

4. Grouting – All leaking holes, missing bricks, missing mortar, cracks or joints shall be grouted as specified in section 02772.

5. Flow Bypassing - The Contractor shall provide all required flow bypassing around the structures to be rehabilitated. The bypass shall be constructed in accordance with these Specifications.

6. Manhole Step Removal - The Contractor shall removal all manhole steps from structures to be rehabilitated. The step shall be cut flush at the existing wall with no burs or protruding metal remaining. The Contractor shall recover and discard all pieces of manhole steps removed. The Contractor shall take any necessary precautions to prevent damage to the existing invert or bench of the structure.

The price for removing existing steps shall be performed under the unit price for the installation of the liner.

7. After completion of surface preparation, the Contractor shall perform the seven point check list, which is the inspection for leaks, cracks, holes, exposed rebar, ring and cover condition, invert condition, and inlet and outlet pipe connection.

8. The Contractor's liner application procedures shall conform to recommendations of the manufacturer, including materials handling, mixing, environmental controls during application, safety and spray equipment. The liner shall be applied to entirety of the interior surfaces of the structure including chimney, walls and benches.

9. Spray equipment shall be specifically designed to accurately ratio and apply the liner system.

10. Application of multi-component liner system shall be in strict accordance with manufacturer's recommendation. Final installation shall be a minimum of 500 mils. Acceptance of the liner shall be based upon the specified thickness. A permanent identification and date of work performed shall be affixed to the structure in a readily visible location.

11. The Contractor shall provide a final written report to Owner and Engineer detailing the location, date of report, and description of repair.

4.04 SCHEDULE

Description	Loading	Access	Location	Admixture
Wet Well Sections & Top Slab	H-20	Floor Door	Franklin Street	Sect. 4.02
Valve Chamber	H-20	Floor Door	Franklin Street	None
Wet Well Top Slab	As required by prepackaged pump station manufacturer	Floor Door	Industrial Drive (Provided as part of prepackaged pump station)	Sect 4.02

END OF SECTION

SECTION 02552
PRECAST CONCRETE MANHOLES

PART 1 GENERAL

1.01 SCOPE

A. This Section includes furnishing and installing precast concrete manholes, including drops and manhole stacks of types and at locations shown on the Drawings and scheduled.

B. This Section includes removing existing structures, additional excavation to widen and deepen trenches for manhole construction, furnishing and installing concrete of classes called for, portland cement mortar, reinforcing steel, precast concrete pipe integral base sections, bottom riser sections, transition sections, and riser sections, eccentric cones, flat slab tops and grade rings, flexible manhole connections, pipe for drop connections, manhole steps, manhole frames and covers, plugging lifting holes, pointing joints, joint wrap installing, forming channels through manhole bottoms, making watertight connections to new and existing sewers, and other work incidental to manhole construction and testing.

C. Additional product requirements are specified in Section 01350.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop drawings for Review:

   a. Manufacturer's Shop Drawings indicating physical dimensions, pipe openings, precast section arrangement, adjusting rings, castings, and joint details for each size and type of manhole components furnished for the project. Shop Drawing shall incorporate the planned elevations and details.

   b. Manufacturer's certification indicating that the manhole components and joints meet specifications for each production run for each size and type furnished.

2. Information for the Record:

   a. The Engineer may request test results to verify certification. Certification documents shall be according to the Source Quality Control of this Section.

PART 2 PRODUCTS

2.01 MATERIALS

A. Type of Manhole Sections:

1. Manhole Stacks - Manhole stacks shall mean 4-feet diameter manholes used for access to reinforced concrete manhole chambers and precast manhole riser tee sections.

2. Type I Manholes - Type I manholes shall mean 4-feet diameter manholes with precast integral base sections for sanitary sewers and either precast integral base sections or precast bottoms for storm sewers. Pipe connections to manholes shall be made with flexible water tight joints. Type I manholes are intended for installation of pipes 18-inch diameter and smaller unless noted otherwise.

3. Type II Manholes - Type II manholes shall mean manholes with 5-feet diameter precast integral base sections. Pipe connections to manholes shall be made with flexible water tight joints. Type II manholes are intended for installation of 21-inch through 30-inch diameter pipes unless noted otherwise.

4. Type III Manholes - Type III manholes shall mean manholes with precast integral base sections or precast bottoms that are larger than 5-feet diameter. The diameter of the bottom riser sections shall be as shown on the Drawings. Pipe connections to manholes shall be made with flexible water tight joints. Type III manholes are intended for installation of pipes where the additional wall area is needed for installation on flexible joints and of 36-inch through 48-inch diameter pipes unless noted otherwise.

5. Type IV Manholes - Type IV manholes shall mean manholes with cut-outs in the bottom riser sections installed on cast-in-place or precast concrete bases. The diameter of the bottom riser sections shall be as shown on the Drawings. Pipe connections above bottom riser section shall be made with flexible water tight joints. Type IV manholes are intended for installation on sewers 48-inch diameter and larger and on existing pipes where identified on Drawings.

6. Type S Manholes - S following manhole type shall mean the designated type manhole constructed with a precast flat slab top in lieu of a precast cone.

B. Precast concrete pipe manhole sections, integral base sections, transition sections, eccentric cones, flat slab tops, and adjusting rings shall conform to ASTM C 478. Reinforcing in transition sections shall be equal to that specified for wall sections of the larger diameter.

C. Joints shall be tongue and groove type with a gasketed seal type conforming to ASTM C443.

D. The standard length of riser sections shall be 48-inch. Lengths of 32-inch or 16-inch shall be used to meet required dimensions and as specified.

E. Openings for connecting pipes in riser sections, bottom riser sections, and integral base sections, and for access in flat slabs shall be pre-formed or cored by the manufacturer, except "cut-out" openings may be made in bottom riser sections for Type IV manholes. Cut-out openings shall be made immediately after the pipe is removed from the casting form. All cored openings for sewer pipe connections shall have flexible joints.

F. Precast integral base sections shall be of monolithic construction. Base flat slab floors or integral floors shall have a minimum thickness of 6-inch for risers up to and including 48-inch in diameter and 8-inch for larger diameters. A layer of reinforcement shall be placed above the midpoint, and shall have a minimum area of 0.12 square inch/linear feet in both directions.

G. Manhole sections shall be constructed with no pipe connection within 6 inches of a joint in the structure.

H. Manhole sections shall be clearly marked and identified with the manhole number, section placement order, casting date, trademark, name of the manufacturer, and location of the production plant.

2.02 ACCESSORIES

A. Manhole Steps - Manhole steps shall be of polypropylene plastic reinforced with a 1/2-inch No. 60 grade reinforcing rod. Steps shall be M. A. Industries Model PS-1, or equal.

1. Specified manhole steps shall be factory installed to provide a continuous ladder of 16-inch Center-to-Center rung spacing. Steps shall be placed in the forms and cast in pipe wall or placed immediately after the pipe is removed from casting and carefully mortared in place with non-shrinking mortar to ensure a watertight joint. Manhole step installation shall be in compliance with OSHA regulations. If the outer surface of the pipe wall is pierced the patch shall be completely covered with a bituminous sealer.

B. Manhole frames and covers shall be as shown on the Drawings and in conformance with requirements of Section 05540.

1. Where pressure tight manhole frames and covers are called for, threaded inserts shall be cast in eccentric cones or flat slab tops and holes formed or cored in adjusting rings to match bolt size and spacing specified for manhole casting.

C. Mortar:

1. Mortar used for the structures herein specified shall conform to ASTM C270 Type S, containing no masonry cement. The mortar shall be composed of one-part portland cement to two parts sand by volume.

2. Non-shrinking Mortar - Materials for non-shrinking mortar shall be Sauereisen F-100, Five-Star, or equal.

D. Cast-in-Place Concrete:

1. All cast-in-place concrete used for concrete bases and for forming channels in manhole bottoms shall be Class A as specified in Section 03300.
2. All concrete used for supporting precast concrete manhole bases shall be Class B as specified in Section 03300.

E. Reinforcing Steel - Reinforcing steel used in cast-in-place concrete shall meet the requirements of Section 03200.

F. Flexible Joints - Joints for precast pipe openings shall be “A-LOK X-CEL” as manufactured by A-LOK Products, Inc., “Kor-n-seal” as manufactured by National Pollution Control Systems, Inc., or equal in accordance with ASTM C923.

G. Pipe for Manhole Drops - Pipe for manhole drops shall conform to specifications of Section 02550 or Section 15210 for the required size and type shown on the Drawings.

H. Joint Wrap - Polyolefin backed exterior joint wrap used to cover the exterior side of joints shall be ConSeal CS212; Riser Wrap by Pipeline Seal & Insulator, Inc. or equal. Minimum width shall be 12 inches. Joint wrap shall include the use of brush or roller applied adhesive surface primer formulated for use with joint wrap. Seal shall meet the requirements of ASTM E1745, C-877, and ASTM C990.

I. Chimney seal shall be applied to the exterior of all manholes and shall cover the joint at iron casting, adjusting ring and lap over manhole riser/top section. Seal shall be HDPE heat shrink as manufactured by Pipeline Seal & Insulator, Inc. (Riser-Wrap) and CCI Pipeline System (Wrapid Seal), or equal.

J. Chimney seals which are installed on the interior of manholes will not be acceptable.

PART 3 EXECUTION

3.01 COORDINATION

A. Location and type of manholes installed shall be as shown on the Drawings or directed.

B. Construction shall be in conformance with details shown on the Drawings and as specified.

C. Excavation for manhole construction shall be prepared as directed in applicable paragraphs of Section 02200.

3.02 INSTALLATION OF INTEGRAL BASE SECTIONS

A. The manhole base may be placed on 6 inches compacted granular bedding material.

3.03 INSTALLATION OF BOTTOM RISER SECTIONS (WITHOUT INTEGRAL BASE)

A. Unless otherwise called for on the Drawings or directed, precast bottom riser sections shall be placed with cast-in-place reinforced concrete bases.

B. The base shall be of Class A concrete 12-inch thick minimum placed on undisturbed earth or a minimum 6-inch-thick aggregate stone cushion. Reinforcing shall be as shown on the Drawings.

C. The cut-out riser section shall be blocked in place above the pipe and the concrete base poured in place. Concrete shall be extended above the lower rim of the riser wall as required to provide a watertight seal around the entire circumference of the riser section. The sewer pipe shall be bedded in concrete monolithic with the base to the first joint each way from the manholes.

D. On straight runs the Contractor may carry the pipe through the manhole and break out the top half after the fill concrete has set. In all cases the pipe shall extend through the manhole wall to the inside face.

3.04 CHANNELING MANHOLE BOTTOMS

A. The bottoms of all manholes shall be channeled to conduct flow in the planned direction. 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 of flow in the sewers and shall match inverts of connection pipe at the manhole wall.

B. Manholes which do not have integral base or channels precast with base section, as approved by Engineer, shall have channels formed and placed in the field with Class A concrete.

3.05 PRECAST CONCRETE RISER SECTIONS

A. The shortest length of riser section to be incorporated into the manhole shall be installed immediately below the eccentric cone section or the flat slab top.

B. Riser section joints shall be pointed and lifting holes filled with non-shrinking mortar.

C. Riser section exterior joints shall be wrapped and sealed with joint wrap as specified herein. Concrete shall be primed a minimum of two times. The first coat shall be allowed to fill concrete depressions and bug holes. Contractor shall follow manufacturer recommendations.

D. Contractor shall protect joint wrap from damage during back filling and other related work.

3.06 INSTALLATION OF MANHOLE FRAMES

A. Manhole frames and covers shall be installed to grades shown on the Drawings or as directed.

B. Adjustment of manhole castings shall be made using specified precast grade rings and portland cement mortar joints or preferred bitumen seals.

C. Each manhole casting shall be anchored in place using four 5/8-inch stainless steel bolts with nuts as detailed on the Drawings or directed.

D. The maximum depth of adjustment below any manhole casting shall be 16 inches and the minimum depth of adjustment shall be 4 inches.

E. In concrete pavement, separate frame from pavement with 1/2-inch thick premolded mastic joint material extending from the base of the frame to the top of the frame.

F. Manhole castings located in pavement areas shall be installed with the top of the casting 1/4 inch below the finished grade of the adjacent pavement surface.

3.07 CHIMNEY SEAL

A. Installation of chimney seal shall be after casting has been adjusted to final grade. Chimney seal shall cover all joints at manhole top including, but not limited to, iron casting, adjusting rings and manhole riser.

B. Chimney seal shall be installed per manufacturer recommendations. Chimney seal shall provide a water tight seal.

3.08 MANHOLE TESTING

A. Each manhole shall be tested in accordance with ASTM C1244 'Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill.' in the presence of the Engineer

B. All lift holes shall be plugged with an approved non-shrink grout before testing.

C. All pipes entering the manhole shall be plugged and braced to prevent being drawn into the manhole.

D. Testing shall be by drawing a vacuum on the manhole using equipment specifically designed for such testing. A test head with necessary gauges and connections shall be placed at the inside of the top of the cone section and sealed in accordance with the manufacturer's instructions. A vacuum of 10 inches of mercury shall then be drawn and the vacuum pump shut off. With valves closed, the time shall be measured for the vacuum to drop to 9 inches. The test shall be successful if the time measured is greater than the required time based on the following chart:

	Diameter (in)				
	48	**60**	**72**	**84**	**96**
Depth (ft.)	**Time (sec.)**				
<4	10	13	16	20	23
6	15	20	25	29	34
8	20	26	33	39	45
10	25	33	41	48	56
12	30	39	49	58	67
14	35	46	57	67	78
16	40	52	67	77	89
18	45	59	73	86	100
20	50	65	81	96	111
22	55	72	89	105	122

	Diameter (in)				
	48	60	72	84	96
Depth (ft.)	Time (sec.)				
24	59	78	97	115	133
26	64	85	105	124	144
28	69	91	113	134	155
30	74	98	121	143	166

E. If the test is unsuccessful, necessary repairs shall be made and retesting shall proceed until a satisfactory test is obtained.

F. If a manhole is constructed of different diameters, the largest diameter shall be used to determine the time required for testing.

G. The Contractor may perform testing after completely backfilling the manhole, and the following modification to the testing procedure shall be followed.

1. Determine depth of water table and depth of manhole being tested.

2. Using above depths, calculate the hydrostatic head above the lowest manhole connection.

3. Adjust test pressure according to the following table:

Hydrostatic Head (ft)	≤12	13	14	15	16	17	18	19	20	21	22
Vacuum Pressure (in Hg)	10	9	8	7	6	5	4	3	2	1	0

4. If hydrostatic head above the lowest manhole connection is equal to or greater than 22 feet, vacuum testing must be completed before backfilling.

PART 4 SPECIAL PROVISIONS

4.01 XYPEX ADDITIVE

A. Contractor to provide crystalline waterproofing additive to precast concrete manholes as indicated on the drawings and as specified herein (Xypex Admix C-500 or C-1000).

B. Concrete waterproofing system shall be of the crystalline type that chemically controls and permanently fixes a non-soluble crystalline structure throughout the capillary voids of the concrete. The system shall cause the concrete to become sealed against the penetration of liquids from any direction, and shall protect the concrete from deterioration due to harsh environmental conditions.

C. The manufacture of the crystalline water proofing shall provide the type of material and the dosage rate for the application. Admix must be added to concrete mix at time of batching. The actual dosage in the mix design shall be certified at the time of application.

D. Manufacturer shall coordinate with the concrete batch facility and other admixture suppliers to ensure compatibility with the concrete mix design, other admixtures and concrete properties. The addition of the crystalline water proofing shall not reduce the

concrete strength or compromise the ASTM specifications or other quality standards governing the concrete mix.

E. Concrete containing Xypex Admix shall be moist cured in accordance with ACI Reference 308, “Standard Practice for Curing Concrete”.

END OF SECTION

SECTION 02555
PRESSURE PIPE

PART 1 GENERAL

1.01 SCOPE

A. This Section includes furnishing and installing pressure pipe of the materials, class, size, and length as shown on the Drawings, specified, or directed.

B. Pressure pipelines constructed under this Section shall include but not be limited to water mains and sewer force mains.

C. This Section shall include furnishing and installing all required pipe, fittings, specials, adaptors, closure pieces, tees, bends, joint restraints, granular pipe bedding material, concrete used for encasement or bedding, removing and relaying existing pressure pipe as required, providing temporary services and temporary blocking or harnessing, making connections to new and existing pressure pipe, installing temporary bulkheads and plugs, testing pipe, cleaning and sterilizing water mains, and other work incidental to the pressure pipe installation, unless specifically included under other Items.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

   a. Manufacturer's Shop Drawing indicating physical dimensions, joint details, fittings, and special details for each size, type, and class of pipe furnished for the project. Shop Drawings shall also note salient features of a specific pipe, i.e., concrete strength and reinforcing details.

   b. Samples, if requested by the Engineer.

2. Information for the Record:

   a. Manufacturer's certification indicating that the pipe and joints meet Specifications for each production run for each size, type, and class of pipe furnished. The Engineer may request test results to verify certification.

1.03 PRODUCT HANDLING

A. Care shall be taken in handling and transporting to avoid damaging pipes and their coatings. Loading and unloading shall be accomplished with the pipe under control at all times and under no circumstances shall the pipe be dropped. Pipe shall be securely wedged and restrained during transportation and supported on blocks when stored in the shop or field.

PART 2 PRODUCTS

2.01 PRESSURE PIPE SPECIFICATIONS

A. Ductile Iron Pressure Pipe (DIP):

1. Ductile Iron Pressure Pipe shall conform to ANSI A21.51 or AWWA C151 and shall be pressure class 350 psi for sizes 12-inch and below, and pressure class 300 psi for larger sizes unless otherwise specified herein.
2. Pipe buried underground, unless otherwise specified, shall be jointed with rubber gasket (push-on) type joints and shall meet the requirements of AWWA C111 for push-on joints. The gasket shall be a single molded rubber ring fitted into a specially shaped recess in the bell forming a pressure tight seal. The spigot end of each pipe shall be marked to indicate when the pipe is “home.”
3. Ductile Iron pipe shall be used for all water mains larger than 16-inches in diameter up to 24-inches in diameter.
4. Internal restrained bell joints, wherever shown or required, shall be mechanical joint with retainer glands, US Pipe TR Flex Joint System, US Pipe Field LOK Gasket System, or equal.
5. Interior Coating – Unless otherwise specified, pipe interiors shall be covered with a standard thickness cement lining meeting ANSI A21.4 and AWWA C104. A seal coat of petroleum asphaltic material shall be applied in conformance with the above Specifications. Pipe used for compressed air shall not receive a concrete lining.
6. Exterior Coating - All buried ductile iron pipe shall be coated on the outside with a standard petroleum asphaltic coating, 1 mil thick, meeting AWWA C110, unless otherwise specified. The finished coating shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun, and shall be strongly adherent to the pipe. The coating materials, after drying 48 hours, shall impart no objectionable color, odor, or taste to water standing in contact with the coating for a minimum of 48 hours.
7. Where approved, the petroleum asphaltic material specified for interior lining may be used for exterior coating of pipe buried underground.

2.02 PRESSURE PIPE FITTINGS

A. Ductile Iron Pipe Fittings:

1. All Ductile Iron Pipe, PVC or PVCO pressure pipe shall utilize Ductile Iron Pipe fittings with mechanical joints as specified in this section.
2. Mechanical joint fittings shall be ductile iron and conform to ANSI A21.10 or AWWA C110 and ANSI A21.53 or AWWA C153. All fittings shall have a pressure rating of 250 psi for all pipe sizes unless otherwise specified.

3. Fittings shall have mechanical joints with retainer glands unless otherwise specified or shown. Retainer glands shall be ductile iron. The restraining mechanism shall impart multiple wedging actions against the pipe. Restraining devices shall be of heat treated ductile iron. Twist-off nuts shall be used to ensure proper actuation of the restraining device. The mechanical joint retainer gland shall be EBAA Iron, Inc., Series 1100 Megalug, or equal.

4. Mechanical joints

   a. Mechanical Joints shall conform to ANSI A21.11 (AWWA C111), except as specified herein.

   b. The mechanical joint retainer gland shall be EBAA Iron, Inc., Series 1100 Megalug, or equal

   c. Mechanical couplings, if required or permitted, shall be Dresser Style 38, or equal.

      Victaulic or equal joints, if required or permitted, shall be of the shouldered type, unless otherwise specified. If a grooved joint is permitted, a thicker pipe shall be used.

5. Bell Restraints

   a. For new PVC Pipe Bell restraints shall be EBAA Iron Series 2800 Restrain Harnesses or approved equal.

   b. For new Ductile Iron Pipe bell restraints shall be EBAA Iron Series 1700 MEGA Lug Harnesses or approved equal.

   c. Split ring harnesses are not permitted for new pipe installations.

2.03 ACCESSORIES

A. Nuts and bolts for buried pipe shall be as follows:

1. Nuts and bolts used in wall castings shall be of stainless-steel Type 316.

2. Nuts and bolts encased in grout on concrete pressure pipe shall conform to recommendations of the pipe manufacturer.

3. Nuts and bolts used on buried pressure pipe and fittings in contact with earth shall be Cor-Blue coated low alloy steel and have a minimum yield strength of 45,000 psi complying with ANSI A21.11 and AWWA C111.

4. All other nuts and bolts shall be low carbon steel in conformance with the chemical and mechanical requirements of ASTM A307, Grade B. Higher strength bolts will be acceptable.

2.04 POLYETHYLENE ENCASEMENT FOR DUCTILE IRON PIPE

A. Buried ductile iron pipe shall be encased in a loose wrapping of polyethylene film at the time of installation. The polyethylene material and method of installation shall meet the requirements of AWWA C105/A21.5.

2.05 SOURCES QUALITY CONTROL

A. Pipe Manufacturer's Certification:

1. The pipe manufacturer's certificate shall state that the materials have been sampled and tested in accordance with the provision for and meet the requirements of the designated specification and shall be signed by an authorized agent of the seller or the manufacturer.

2. A test results report shall accompany the manufacturer's certificate, if requested by the Engineer. The report shall compare test results to Specification requirements. Test specimens shall be selected in conformance with the designated specification for each production run of each size, type, and class of pipe furnished and further, that in case tests are unsatisfactory, additional tests shall be made to the maximum number in the referenced ASTM Specification.

PART 3 EXECUTION

3.01 COORDINATION

A. Construction in Highway Properties

1. Construction in highway properties shall conform to the requirements of Section 02200.

3.02 PREPARATION OF TRENCH

A. Trench excavation shall conform to requirements of Section 02200.

B. Unless otherwise specified or called for on the Drawings, the width of trench at the top of pipe 24 inches in diameter or less shall not exceed the outside diameter of the pipe or encasement, plus 9 inches on each side of the pipe measured to the face of the trench or to the back of the sheeting when used. For pipe having a diameter greater than 24 inches, the width of trenches at the top of the pipe shall not exceed the outside diameter of the pipe or encasement, plus 15 inches on each side of the pipe measured as specified above.

C. Unless otherwise directed or called for on the Drawings, all sewer trenches shall be excavated below the proposed pipe invert as required to accommodate the depths of pipe bedding material as scheduled on the Drawings.

3.03 PIPE INSTALLATION

A. All pipe fittings and specials shall be laid in accordance with the manufacturer's instructions, with AWWA C600, and as supplemented herein.

B. Precautions shall be taken during construction to protect the pipe interiors, fittings, and valves against contamination. Pipe interiors shall be thoroughly cleaned of dirt and foreign matter before laying, by brushing, swabbing or other method approved by the

Engineer, and means shall be provided to prevent entry of dirt during the progress of installation. Groundwater shall be kept out of the pipe at all times.

C. Bedding and Backfilling:

1. Bedding and backfilling shall be in conformance with Section 02200.

2. At joints, enough depth and width shall be provided to permit working entirely around the pipe as needed to make the joints in the proper manner.

D. Handling and Cutting:

1. Suitable tools and appliances for cutting, handling, and laying of the pipes and special castings shall be used and care shall be taken to prevent damage to pipe coatings.

2. Where new or existing pipe requires cutting in the field it shall be done in a manner to leave a smooth end at right angles to the pipe centerline. The finished cut must be approved by the Engineer.

E. Pipe Laying:

1. Pipe and appurtenances shall be installed true to line, grade, and location; with joints centered, spigots home; pipe properly supported and restrained against movement; and all valve stems plumb.

2. All elbows, tees, plugs, etc., shall be properly anchored, blocked, or otherwise restrained to prevent movement of the pipe in the joints due to internal or external pressure.

3. The open ends of all pipes and special castings shall be plugged or otherwise closed with a watertight plug to the approval of the Engineer before leaving the Work for the night, and at other times of interruption of the Work. All pipe ends which are to be permanently closed shall be plugged or capped and restrained against internal pressure.

F. Pipe Jointing:

1. Gaskets - Just prior to joining the pipes, the surfaces of the joint rings shall be wiped clean and the joint rings and rubber gaskets shall be liberally lubricated with an approved type of vegetable oil soap. The spigot end, with the gasket placed in the groove, shall be entered into the bell of the pipe already laid, making sure that both pipes are properly aligned. Before the joint is fully “home,” the position of the gasket in the joint shall be determined by means of a suitable feeler gauge supplied by the pipe manufacturer. If the gasket is found not to be in proper position, the pipes shall be separated and the damaged gasket replaced. The pipe is then forced “home” firmly and fully. In its final position, the joint between the pipes shall not be deflected more than 1/2 inch at any point.

2. Electrical Continuity - Where specified, electrical continuity shall be provided in concrete and steel pressure pipes by welding an insulated #4RR copper cable across joints. The cable shall be welded to the steel of bell and spigot of

concrete pressure pipe and across joints including each piece of coupling on jointed steel pipes.

G. Anchoring Pipe:

1. Disjointing hydrostatic pressure at bends, plugs, tees, and wyes shall be counteracted by thrust blocks, restrained joints, or reinforced concrete anchorage as directed on the Drawings or specified.

2. Thrust blocks shall be installed only where directed or specifically called for on the Drawings, unless otherwise specified. Installation shall be in conformance with Drawings.

3. Approved joint restraints shall be installed in locations shown or scheduled on the Drawings.

4. Reinforced concrete joint anchorage shall be installed in conformance with the Drawings.

3.04 PIPE PROTECTION

A. Detectable marking tape shall be installed in the trench of each non-metallic pipe. The tape shall be installed directly above the force main at the depth recommended by the manufacturer. The tape shall extend the full length of the force main, and shall be imprinted with a continuous warning message repeated at least every 36 inches. The warning message shall state that a sewer line is buried below. The tape shall consist of one layer of aluminum foil laminated between two layers of inert plastic film. The lamination bond shall be strong enough that the layers cannot be separated by hand. The tape shall be inductively located and conductively traceable using a standard pipe and cable locating device.

B. Utility markers and locator stations shall be installed with 42 inches to 48 inches above ground.

3.05 FIELD INSPECTION

A. All pipe sections, specials, and jointing materials shall be carefully examined for defects and no piece shall be laid that is known to be defective. Any defective piece discovered installed shall be removed and replaced with a sound one in a manner satisfactory to the Engineer at the Contractor's expense.

B. Defective material shall be marked with lumber crayon and removed from the job site before the end of the following day.

3.06 PRESSURE AND LEAKAGE TESTS

A. The Contractor shall furnish the pump, pipe connections, taps, gauges, auxiliary water container, bulkheads, plugs, and other necessary equipment and make pressure and leakage tests of all lines unless otherwise directed by the Engineer.

B. Tests shall be conducted on all pipelines or valved sections thereof as directed by the Engineer. Testing of pipelines laid in embankments or bedded in concrete shall be done prior to backfilling or placing concrete cover unless otherwise permitted by the Engineer. Tests on lines anchored or blocked by concrete shall not be conducted until the concrete has taken permanent set. A maximum of 1,000 feet of pipe may be included in a test section. All valves shall be tested for leakage.

C. The line or section thereof to be tested shall be filled slowly with water to expel all air. Hydrostatic pressure shall be applied by pumping water from an auxiliary supply. The test pressure shall be maintained two hours minimum and additional time as required for thorough inspection to find any leaks or defects in the force main and appurtenances. The test pressure shall be 150 pounds per square-inch or 50% above the normal operating pressure, whichever is greater. Should the pipe section fail to pass the tests, the Contractor shall find and correct failures and repeat the tests until satisfactory results are obtained.

D. Leakage tests shall be made simultaneously with or following completion of pressure tests of all lines or valved sections thereof. Leakage is defined as the quantity of water added to the pipe under test to maintain the required test pressure for a specified time.

E. Pressure testing shall be performed in accordance with AWWA C600 and C605.

3.07 RESERVED

PART 4 SPECIAL PROVISIONS

4.01 UTILITY MARKERS/LOCATORS

A. Utility Markers or Location Station shall be installed along pipeline.

B. Utility Markers and Locator Stations labels shall have the following wording on the labels. “Raw Wastewater“

4.02 PIPING SCHEDULE

A. The following letter designations are used in the Piping Schedule:

Material Designation:

DIP - Ductile Iron Pipe
PVC - Polyvinyl Chloride
PCCP - Prestressed Concrete Pressure Pipe

B. Schedule:

Service	Size	Pressure Class Thickness Class	Material
Raw Wastewater – Industrial Drive PS	6”	350	DIP with internal bell restrains per 2.01, A, 4
Raw Wastewater – Franklin Street PS	8”	350	DIP with internal bell restrains per 2.01, A, 4

C. Schedules are not guaranteed to be complete. All piping shown on the Drawings or specified shall be furnished and installed by the Contractor whether or not listed in the above schedule.

D. This section applies to buried pipe only. See Section 15210 for flanged pipe inside structures.

4.03 PERMANENT & TEMPORARY BLOWOFFS/TAPS

A. The Contractor shall provide all blowoffs and taps as necessary to properly exhaust air from test sections, flush & disinfect the new pressure pipe system.

4.04 PRESSURE PIPE ELEVATIONS

A. Elevations shown on the plans shall be checked as specified in this Section.

B. Any deviation in the pipe elevations shall be brought to the Engineer's attention to permit the Engineer to evaluate the impact upon air release mechanism placements.

4.05 TESTING

A. A leakage test will be required on the portion of the new force main installed at Franklin Street between plug valves.

B. No leakage test will be required for the Industrial Drive Force Main.

END OF SECTION

SECTION 02772
CHEMICAL GROUT REHABILITATION

PART 1 GENERAL

1.01 SCOPE

A. This work shall consist of the furnishing of all labor, equipment and materials necessary to rehabilitate structures using chemical grout injection as specified in the Contract Documents.

B. The Contractor will be required to perform the work with the structures in service or to provide appropriate measures to pump flow around the work area.

C. Structure deficiencies to be corrected during the rehabilitation shall include, but shall not necessarily be limited to stopping active leakage of ground or surface water into the structure.

D. The Contractor shall be responsible for inspecting the structures prior to commencing work, to ensure that the proposed repair method is appropriate for rehabilitation of the structures as shown in the Contract Documents.

1.02 SUBMITTALS

A. Submittals shall be in accordance with all requirements of Section 01300 and shall include:

1. Equipment operating procedures and systems.
    a. Identify the manufactures and models of the packers to be utilized on the project.
2. Manufacturer's product data for chemical grout materials.
    a. Storage, mixing, testing and handling recommendations.
    b. Description of recommended additives.
    c. MSDS sheets for all materials to be used.

B. The Contractor shall submit the following information following the completion of all grouting or attempted grouting of each structure. The report shall include the following data referenced to the Owner's database:

1. Identification of the structure grouted.
2. Volume of grout material used on each joint or connection.
3. Gel set time used (cup test results from tanks)
4. Grout mix record of the batches mixed including amount of grout and catalyst, additives, temperature of the grout solution in tanks.
5. Operator conducting testing and sealing shall be noted on the reports.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. The Contractor shall be licensed or certified by the grout liner material manufacturer for the liner method employed to execute the work. It shall be the Contractor's responsibility to ensure that the liner material is installed in accordance with the manufacturer's requirements and recommendations.

2. The Contractor shall provide personnel thoroughly trained and experienced with the liner method employed to execute the work.

1.04 WARRANTY

A. The Contractor shall provide a minimum 2-year warranty on all materials provided for the liner.

PART 2 PRODUCTS

2.01 MATERIALS

A. The materials to be used shall be designed specifically for structure rehabilitation as recommended by the manufacturer.

B. Chemical Grouts - Water based chemical grouts shall have the following characteristics:

1. A minimum of 10 percent acrylamide base material by weight in the total grout mix. A higher concentration of acrylamide base material is recommended to increase strength or offset dilution during injection.

2. The ability to tolerate some dilution and react in moving water during injection.

3. A viscosity of approximately 2 centipoise, which can be increased with approved additives.

4. A controllable reaction time from 10 seconds to 1 hour.

5. A reaction (curing) that produces a homogenous, chemically stable, non-biodegradable, firm, flexible gel.

6. The ability to increase mix viscosity, density and gel strength by increased concentrations of the mix constituents or by the use of approved additives.

7. Chemical Grouts shall be Avanti AV-100, Avanti AV-118, DeNeef Hydro-Active; or approved equal.

C. Acrylate Base Grout - Acrylate Base Grout shall have the following characteristics:

1. A minimum of 10 percent acrylate base material by weight in the total grout mix.

2. The ability to tolerate some dilution and react in moving water during injection.

3. A viscosity of approximately 1 to 3 centipoise, which can be increased with approved additives.

4. A controllable reaction time from 10 seconds to 1 hour.
5. A reaction (curing) that produces a homogenous, chemically stable, non-biodegradable, firm, flexible gel.
6. The ability to increase mix viscosity, density and gel strength by the use of approved additives.
7. Acylate Base Grouts shall be DeNeef AC-400, DeNeef Gelacryl SR, Avanti AV-160; or equal.

D. Additives:

1. At the Contractor's discretion and with the Engineer's approval and consistent with the product manufacturer's recommendations, and according to field conditions, additives may be selected and used to achieve additional performance requirements.
2. Strengthening Agents - For joint grouting, a latex or "diatomaceous earth" additive may be added to increase compressive and tensile strength. The quantity of strengthening agent additive shall be as recommended by the manufacturer and approved by the Engineer. Strengthening agents shall be Avanti AV-257 Icoset, DeNeef Reinforcing Agent or approved equal.
3. Gel Time Modifier - A gel time extending agent may be used in accordance with the manufacturer's recommendations to extend gel time as necessary.
4. Freeze/Thaw - In those lines where the grouting material may be exposed to a freeze thaw cycle, ethylene glycol or other Engineer-approved additive shall be used to prevent chemical grout cracking once set.
5. When using non soluble additives the grout tanks must have mechanical mixing devices to keep the additives in suspension and maintain a uniform solution of grout and additive.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall perform all structure rehabilitation work in accordance with local standards, the manufacturer's recommendations and requirements as directed by the Engineer. Extreme care shall be used to prevent debris from entering the sanitary sewer flow during the execution of the work.

B. Mixing and material handling of chemical grouts shall be performed in accordance with the manufacturer's recommendations.

3.02 DRILLING AND GROUT INSTALLATION

A. Injection holes shall be drilled through the structure wall at locations recommended by the manufacturer.

B. Grout travel shall be verified by observation of grout to defects or adjacent injection holes. Provide additional injection holes, if necessary to ensure grout travel.

C. Injection holes shall be cleaned with a drill and patched with a waterproof quick setting mortar such as DeNeef Dene-Plug or Dene-Plug Hot Material, or approved equal.

D. Grout shall be injected through the holes under pressure with suitable injection packers and/or wall spears. Injection pressure shall not cause damage to the structure or surrounding surface. Grout shall be injected through the lowest holes first, working upward. The procedure shall be repeated until the structure is externally sealed with grout.

E. Grouting from the ground surface shall not be permitted.

3.03 ACCEPTANCE

A. Following installation, the work shall be visually inspected by the Engineer. Any defects noted shall be corrected in accordance with the requirements of these Specifications and the manufacturer's recommendations.

PART 4 SPECIAL PROVISIONS

4.01 MAINTENANCE OF FLOW

A. All control measures for managing wastewater flow around the work area shall be the responsibility of the Contractor. Costs for plugging, blocking, pumping and bypassing flow around the work area shall be incidental to the cleaning, televising, and testing work.

B. The Contractor shall provide dams, plugs, bypass pumping equipment and other required measures to maintain flow in the sewer collection system during the work.

C. The Contractor may be permitted to block the flow in the sewer for a period of time as approved by the Owner depending upon weather conditions, the flow in the sewer collection system and other considerations.

END OF SECTION

SECTION 02800
SODDING, SEEDING AND MULCHING

PART 1 GENERAL

1.01 SCOPE

A. This Section includes fine grading, placing sod, and seeding and mulching areas designated on the Drawings, specified, or ordered.

B. The Work consists of fine grading; furnishing and placing topsoil; sod seed, mulching material; and fertilizer; and watering seeded or sodded areas until growth is established.

C. The Contractor shall restore all grass areas damaged by his operations in construction of facilities included in the Contract.

D. Unless otherwise specified herein or directed, Work shall be in conformance with ODOT Item 659 Seeding and Mulching, and Item 660 Sodding.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

   a. Manufacturer's project information for materials.

2. Information for the Record:

   a. Submit to Resident Project Representative:

      1) Invoices showing the weight, brand, and composite analysis of all fertilizer used on the Project.

      2) Bag tickets showing weight and composition of all seed used on the Project.

PART 2 PRODUCTS

2.01 SOD

A. Sod shall conform to ODOT Item 660.02, unless otherwise specified in Part 4.

2.02 SEED

A. Seed mixtures shall be in conformance with the requirements of ODOT Item 659.07 and ODOT Item 659.09 Class 1, unless otherwise specified in Part 4.

2.03 FERTILIZER

A. Commercial fertilizers shall be from a dealer or manufacturer whose brands and grades are registered or licensed by the State of Ohio, Department of Agriculture. The content of nutrients shall be 12-12-12, unless otherwise approved by the Engineer.

2.04 MULCHING MATERIAL

A. Mulching material shall be straw, wood fiber, or compost reasonably free of weed seed, and other foreign materials. Mulch shall meet the requirements of ODOT Item 659.13, and either Item 659.14, 659.15, or 659.16.

2.05 MATTING MATERIAL

A. Matting material shall be in conformance with the requirements of ODOT Item 712.11 Type A or B.

2.06 TOPSOIL

A. Topsoil furnished by the Contractor shall be as specified in Section 02200.

PART 3 EXECUTION

3.01 FURNISHING AND PLACING TOPSOIL

A. Areas from which the top layer of soil has been removed or disturbed shall be recovered with a minimum of 4 inches of topsoil placed in conformance with Section 02200 or ODOT Item 659.11.

3.02 PREPARATION

A. The operation of finish grading and sowing shall not be performed when the ground is frozen or muddy.

B. Areas to be Sodded:

1. Preparation of areas to be sodded shall be in conformance with ODOT Item 660.04.

C. Areas to be Seeded:

1. Unless otherwise shown on the Drawings or specified in Part 4, all areas of disturbed soils on the Site shall be seeded.
2. The area to be seeded shall be prepared in accordance with Section 02200 or ODOT Item 659.
3. Fertilizer shall be applied at a standard dry application rate of 10 pounds per 1000 square feet. Either dry or liquid fertilizer may be used and shall be distributed in an even pattern over the specified area, then thoroughly disked, harrowed, or raked into the soil to a depth of not less than 1 inch.

3.03 INSTALLATION

A. Sodding:

1. Sod shall be placed in conformance with ODOT Items 660.05 and 660.06.

2. No sod shall be placed when the temperature is below 32 degrees F. No frozen sod shall be placed nor shall any sod be placed upon frozen soil. When sod is placed between the dates of June 1 and October 15, it shall be covered immediately with a straw mulch 1-inch thick, loose measurement.

B. Seeding:

1. The seed shall be mixed thoroughly and sown evenly at a rate specified in ODOT Item 659.09. The seed mixture may be sown dry or hydraulically unless directed otherwise in Part 4 of this Section.

2. The seed mixture shall be applied when the soil is in a workable condition and shall be raked into a depth of approximately 1/4 inch.

3. Seed shall be sown only between May 1 and October 15, unless otherwise permitted by the Engineer.

C. Mulching:

1. Within 24 hours after an area has been seeded, it shall be mulched in conformance with one of the following specified methods as designated in Part 4.

2. Mulch:

a. Mulching with straw shall be in conformance with ODOT Item 659.14, except that in front of residences, the mulching material shall be kept in place by an approved non-tracking adhesive or other approved method in lieu of the specified asphalt emulsion. Mulching with wood fiber shall be in accordance with ODOT Item 659.15 and mulching with compost shall be in accordance with ODOT Item 659.16.

b. Matting shall be used as mulch on slopes greater than 3:1 and shall be placed in conformance with the applicable portions of ODOT Item 671.

D. Seeded and sodded areas shall be watered and maintained as specified below until they are established.

1. The seed bed shall be thoroughly watered, as soon as the seed is mulched.

2. Water shall be applied by a hydro-seeder or water tank under pressure with a nozzle producing a spray that will not dislodge the mulching material.

3. Water applications shall be made at rates and at frequencies necessary to establish the growth of grass to its full density and to a minimum height of 2 inches.

4. The rate application shall be 120 gallons per 1,000 square feet.

5. The Contractor shall keep all sodded areas, including the subgrade, thoroughly moist for two weeks after sodding. After the two-week period, the Contractor shall water the sod as necessary to maintain its healthy condition until accepted by the Owner.
6. Matting areas shall be maintained until all Work on the Contract has been completed and accepted.
7. Seeded and sodded areas shall be maintained by the Contractor until acceptance by the Owner. The Contractor shall repair and restore any damaged areas. Repair of the damaged area shall be performed using the same materials and procedures as used for the original installation of the area.
8. The Contractor shall clean all surfaces coated with hydro-seeding overspray. Contractor shall be responsible for surface staining or damage caused by hydro-seeding and restoration damage or staining.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

SECTION 03305
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SCOPE

A. This Section includes cast-in-place concrete along with formwork, waterstops, joint systems, stair nosings, reinforcing, mix design, placement procedures, and finishes as indicated on the Drawings and as specified herein.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:
   - a. Concrete mix designs including substantiating data and test records.
   - b. Product literature for admixtures, curing compounds, and miscellaneous materials.
   - c. Locations of construction and control joints not shown on Drawings, and proposed changes in locations.
   - d. Material certifications.
   - e. Aggregate gradation and percentages of deleterious substances.
   - f. Batch plant certification.
   - g. Placing drawings shall indicate:
     - 1) Construction joints, splice locations, and splice lengths.
     - 2) Bending schedules.
     - 3) Accessories.
2. Information for the Record:
   - a. Manufacturer’s application instructions for miscellaneous materials.
   - b. Quality control test reports.
   - c. Slab profile report.

B. Copy of concrete delivery ticket shall be presented to Resident Project Representative for each batch. Delivery ticket shall indicate:

1. Name of ready-mixed company and plant designation.
2. Truck number.
3. Concrete class.

4. Quantity of concrete.
5. Date.
6. Time when batch was loaded.
7. Type and name of admixtures.
8. Actual batch weights of cement, fly ash, aggregates, and water.
9. Location of pour and time of unloading shall be added to the ticket at Site.

1.03 QUALITY ASSURANCE

A. Concrete work shall comply with provisions of the current editions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified.

1. ACI American Concrete Institute.
2. CRSI “Manual of Standard Practice”.
3. AWS “Code for Welding in Building Construction”.

B. Concrete Manufacturer Qualifications - Manufacturer of ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment.

C. Concrete Testing Service - A qualified independent testing agency shall perform material evaluation tests and shall design concrete mixes.

D. Maintain adequate supervision and control of dewatering operation to ensure that stability of excavated and constructed slopes are not adversely affected by water, erosion is controlled, and flooding of excavation or damage to structures does not occur.

E. Batch Plant:

1. Batch Plant shall be central batch plant with automatic or semi-automatic control. Concrete may be mixed using either central-mixed, shrink-mixed, or truck-mixed methods. If concrete is shrink-mixed or truck-mixed, the truck and concrete producer shall conform to ASTM C94.
2. Batch plant shall be certified by the Department of Transportation, National Ready Mixed Concrete Association (NRMCA) or an independent certification using NRMCA “Check list for Certification of Ready Mixed Concrete Production Facilities” executed and certified by independent Professional Engineer registered in state of Site. Evidence of current certification shall be submitted.

F. Pre-Installation Conferences:

1. Before beginning concrete work, Contractor shall hold a meeting to review detailed requirements for preparing concrete mix designs and to determine proper procedures for concrete construction.
2. A representative of Contractor, testing laboratory, concrete producer, and Engineer shall be in attendance.

1.04 DELIVERY AND HANDLING

A. Concrete shall be delivered in accordance with ASTM C94, except concrete shall be completely discharged within one hour after introduction of mixing water to cement.

B. Concrete shall be delivered in agitating trucks or in mixing trucks operating at agitating speed.

PART 2 PRODUCTS

2.01 MATERIALS - Materials used in concrete construction shall meet all the requirements of applicable ASTM and other industry standards.

A. Portland cement - ASTM C150, Type I or II unless indicated otherwise.

B. Air-entraining Agent - ASTM C260, chloride ion free.

C. Chemical Admixtures (Water Reducing Agents, Superplasticizers, Accelerator) - ASTM C494, chloride ion free.

D. Pozzolan (Fly ASN) (Fly Ash) (GGBF Slag) - ASTM C618, Class F. ASTM C989 grade 100 or low and shall contain less than 12% alumina (C34).

E. Aggregates - ASTM C33.

F. Reinforcing Steel - ASTM A615, Grade 60, deformed.

G. Welded Wire Fabric; Plain - ASTM A185, (undeformed wires) with weld intersections not exceeding 12 inches.

H. Water - ASTM C94, clean and potable.

I. Membrane Curing Compound - ASTM C309, minimum 30% solids content, non-yellowing, moisture loss not to exceed .039 grams per square cm in 72 hours when applied at a coverage rate of 250 square feet per gallon, VOC compliant, water-based acrylic polymer resin. “Safe Cure & Seal – 30% by Dayton Superior or equal.

J. Sheet Curing Compound - ASTM C171.

K. Formwork - ACI 301 and ACI 347R.

L. Form Coating - Non-staining.

M. Preformed Expansion Joint Filler:

1. Exterior Walks and Pavements - “Fibre Expansion Joint” by W. R. Meadows or equal; asphalt impregnated cellular fibers securely bonded together in conformance with ASTM D1751.

2. Other Location - “Sealtight Self-Expanding Cork” by W. R. Meadows or equal: self-expanding cork type expansion joint filler in conformance to ASTM D1752, Type III.

3. Isolation Joints - “Ceramar Flexible Foam” by W. R. Meadows or equal; flexible foam expansion joint filler.

N. Joint Sealer, Vertical - ASTM C920, Type M, Cass 25, Grade NS, Dymeric 240, by Tremco or Sikaflex-2c NS by Sika Corp. or equal.

O. Joint Sealer, Horizontal - ASTM C920: THC-900 by Tremco or "Sikaflex - 2C SL" by Sika Corp. or equal.

P. Vapor Barrier - ASTM D2103 - 6 mil polyethylene.

Q. Waterstop:

1. Type A waterstop shall be 9 inches wide by 3/8-inch nominal thickness ribbed waterstop with a 1/2 inch inside diameter center bulb, Greenstreak, Inc. No. 735, or equal. Type A water stop with split flange shall be Greenstreak No. 727, or equal.

2. Type B waterstop shall be 6 inches wide by 3/8-inch nominal thickness ribbed waterstop without center bulb, Greenstreak No. 679, or equal. Type B water stop with split flange shall be Greenstreak No. 724, or equal.

3. Type C Waterstop-bentonite/butyl rubber compound coiled strips with minimum bentonite content of 75%. For slabs and walls greater than 8 inches thick, waterstop strip shall be 1-1/4 inch by 1/2-inch trapezoidal shape with reinforcing scrim equal to American Colloid Company "Volclay" RX 101 T. For slabs or walls 8 inches thick or less but at least 5 inches thick, waterstop strip shall be 3/4 inch by 3/8-inch half circle shape equal to American Colloid Company "Volclay" RX 102.

R. Miscellaneous Metals - ASTM A36.

S. Anchor Bolts - ASTM A307.

T. Expansion Bolts - Hilti Kwik Bolt 3 or equal.

U. Anchor Bolt Sleeves - Sinco Products, Inc. or equal; high density polyethylene

V. Stair Nosing - Alumogrit Type 116 by Wooster Products, Inc., or equal; abrasive cast aluminum with concealed integral steel anchors.

W. Bonding Agent for New to Existing Concrete - "Sika Armatec 110 Epocem" by Sika or equal. (Epoxy modified cementitious product.)

X. Dry Shake, Non-Metallic - "Surflex" by Euclid or "MasterTop 100" by Master Builders, or equal.

Y. Galvanizing - ASTM A123 or A153.

Z. Epoxy Adhesive for Embedding Dowels into Existing Structures – 100% solids, 100% reactive epoxy conforming to ASTM C881, Type IV, Grade 3, Class B and C. The minimum bond strength per ASTM C882 shall be 1800 psi at 7 days. The adhesive shall be formulated to withstand the maximum allowable published loads permanently without creep or failure. The adhesive shall be Hilti "HIT-RE 500 V3" or equal. Power/Rawl "Power-Fast" epoxy with "Fast Set" formulation shall not be used.

AA. Epoxy Coating for Protection of Exposed Reinforcing Steel Bars at Concrete Saw Cut and Removal Locations - MasterEmaco P124 by Master Builders, or equal. "Sika Armatec 110 Epocem" by Sika Corp. or equal.

BB. Joint Dowel Bars - Plain steel bars, ASTM A615, Grade 60. Cut bars true to length with ends square and free of burrs.

CC. Include spacers, chairs, bolsters, ties, and other devices that conform to CRSI specifications necessary for properly placing, supporting and fastening reinforcement in place. Metal accessories shall be plastic coated, galvanized or stainless steel where legs will be exposed in finished concrete surfaces. For slabs-on-grade, use supports with sand plates or horizontal runners for any areas where the base material will not support chair legs. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).

DD. Use one brand of cement throughout the entire project, unless otherwise approved by the Engineer.

2.02 CONCRETE MIX DESIGN

A. Mixture proportioning for concrete structures shall be in accordance with ACI 301, 318, and 211.1 but subject to the following requirements.

B. Two normal weight concrete mixes are generally required; Class A and Class B. Concrete mixes shall be as follows. Batch in accordance with ASTM C94 and the following:

	Class A	**Class B**
Type of Portland Cement:	I	I
28 Day Compressive Strength (psi):	4500	1750
Slump (inches) +/- 1 inch:	2-4	1-6
Air Content (%) +/- 1%:	6.0	(Not req'd)
Minimum Aggregate Size (inches):	1 (size #57)	1 (size #57)
Water Reducing Agent:	Yes	(Not req'd)
Minimum Cementitious Content (lbs) (Cement and Fly Ash):	550	375
Minimum Portland Cement Content	80% by weight of total Cementitious material.	
Maximum Fly Ash Content:	20% by weight of total cementitious material	
Maximum GGBF Slag Content	20% by weight of local cementitious material.	
Maximum Water/Cementitious Ratio:	0.45	0.70

C. Contractor shall design and be responsible for the performance of all concrete mixes of specified quality, consistency, and workability to permit concrete to be worked readily into forms and around reinforcement without segregation or excessive bleeding. Hardened concrete shall develop all characteristics required by contract documents.

D. Concrete mixes shall be proportioned to maximize durability and water tightness and to minimize shrinkage. To this end, total water content shall be kept to the lowest possible

amount consistent with placing and consolidation methods. Water reducing and high range water reducing admixtures shall be used as required to maintain workability. Specified water/cementitious ratio shall not be exceeded.

E. Concrete proportions shall be established on the basis of previous field experience, or laboratory trial batches in accordance with ACI 301, ACI 211.1 and ACI 318. Proposed mix design shall be accompanied by complete standard deviation analysis or trial mixture test data.

F. Concrete proportions shall be subject to Engineer's approval. Substantiating data and test records shall be submitted.

PART 3 EXECUTION

3.01 COORDINATION

A. Reinforcement, sleeves, inserts, anchors, waterstops, and other embedded items shall be accurately placed, supported, and tied prior to concrete placement. Other trades and contractors required to furnish embedded items shall be given ample notice of concrete placement. Reinforcement and embedded items shall be subject to review of Resident Project Representative prior to placing concrete.

B. Contractor shall notify Resident Project Representative a minimum of 48 hours before placing concrete, excluding nonworking days.

C. Concrete shall be placed only between hours of 8:00 a.m. and 6:00 p.m., unless otherwise permitted. Concreting shall not be placed after 12:00 noon on the last working day of the week.

3.02 PREPARATION

A. Unless adequate protection is provided, concrete shall not be placed during rain, sleet, or snow, or when inclement weather is imminent.

B. Cold Weather - When the average temperature of surrounding air is expected to be below 40 degrees F during placing or within 24 hours thereafter, cold weather concreting in accordance with ACI 306R "Standard Specification for Cold Weather Concreting" shall apply.

C. Concrete shall be protected from extremes in temperature as specified. During periods not defined as cold weather, but when freezing outdoor temperatures are foreseen or occur, concrete surfaces shall be protected against freezing for the first 24 hours, minimum, after placement.

D. Hot Weather- When the ambient temperature is 90 degrees F. or above, or when conditions of concrete temperature, air temperature, wind velocity, and relative humidity combine to cause flash set, excessively low slump, cold joints, plastic shrinkage cracking, or otherwise impair the quality of concrete, hot weather concreting procedures in accordance with "Hot Weather Concreting - ACI 305R," shall apply.

E. When the evaporation rates of bleed water exceed 0.1 pounds per square feet per hour, steps shall be taken to prevent plastic shrinkage cracking. Evaporation rate shall be determined by method shown in "Hot Weather Concreting - ACI 305R."

3.03 INSPECTION, STARTUP, AND TESTING

A. Notify Engineer 48 hours prior to placement of concrete.

B. Engineer's approval is required for subgrade, formwork, and reinforcing prior to starting each placement.

C. Submit proposed concrete mix design to Engineer for review prior to commencement of any Work. Do not begin concrete production until the proposed mix design has been approved by the Engineer.

D. The following tests shall be performed by an independent testing laboratory acceptable to the Engineer during progress of the Work:

1. Compression Tests Cylinders - Strength test shall consist of three cylinders molded and cured. Cast three cylinders for each 50 cubic yards, or fraction thereof, for each class of concrete placed on any one day, but at least three for each day. Test one cylinder at seven days and two at 28 days in accordance with ASTM C39.

2. Slump Tests - ASTM C143. Slump shall be measured for first batch of each concrete class delivered in morning and afternoon, for each strength test, and whenever consistency of concrete appears to vary.

3. Air Entrainment - ASTM C173 or C231. Perform one test for every second ready-mix truck load.

4. Temperature ASTM C1064. Perform with each slump test.

E. If the measured slump or air content fall outside the specified limits, make an additional test immediately and on each successive batch until the specified requirements are met by two consecutive batches.

F. Materials and installed Work may require testing and retesting at any time during progress of Work. Tests, including retesting of rejected materials for installed work shall be done at Contractor's expense.

G. Test Reports:

1. The testing laboratory shall submit test reports directly to the Contractor, the concrete supplier, and Engineer. Reports shall be identified by the project name and number, and the portion of the structure represented. Reports shall include the dates of casting and testing, air and concrete temperatures, specified strength and mix design, actual strength and mix design, slump, air content, and the name of individual making the test.

2. The testing laboratory shall notify the Engineer immediately by telephone when a low strength break occurs or specifications are not met.

3.04 FORMWORK

A. Formwork shall conform to ACI 347R.

B. Formwork shall be designed to safely support vertical and lateral loads, until such loads can be safely supported by concrete structure. Loads shall be carried to ground by formwork and in-place construction of adequate strength.

C. Formwork shall be designed for dead and live loads, weight of concrete, wind, construction loads including impact, and other loads which act or might act on formwork.

D. Formwork shall be designed for pressure of concrete giving due consideration to rate of concrete placement, methods of placement, method of consolidation, concrete mix design, temperature, and other factors pertinent to formwork design.

E. Forms shall have sufficient strength and rigidity to maintain specified tolerances.

F. Formwork shall be securely braced and anchored against deflection and displacement.

G. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood insets shall be used for forming keyways, reglets, recesses, and the like for easy removal.

H. Form ties shall be adjustable in length to permit tightening of the forms and so made that no metal remains nearer than 1-1/2 inch to the concrete surface after the ends are removed. Spreader devices shall leave holes no greater than 7/8 inch in diameter. Washers or buttons leaving shallow depressions in the surface will not be permitted. Twist type ties may be used only for unexposed concrete.

I. Provide holes in the form for insertion of vibrators to properly consolidate concrete.

J. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.

K. Chamfer exposed corners and edges using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

L. The maximum allowable tolerance in either the horizontal or vertical planes shall be 1/4 inch in 10 feet.

M. Provisions for Other Trades - Provide openings in concrete formwork to accommodate Work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

N. Oil temporary forms with non-staining form oil.

O. Cleaning and Tightening - Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing

concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.05 DOWELING TO EXISTING STRUCTURE

A. Dowels shall be embedded into existing concrete where shown on Drawings. Unsound concrete shall be reported to Engineer.

B. Adhesive dowels shall be placed in holes larger than the reinforcement diameter using a rotary percussion hammer and carbide bit. Hole diameters shall be as recommended by manufacturer for each specific reinforcing diameter.

1. Unless indicated otherwise, adhesive dowels shall be embedded as follows:

Stud Diameter	Minimum Embedment
#3	3-1/4 inches
#4	4-3/8 inches
#5	5-3/4 inches
#6	6 inches
#7	7-1/4 inches
#8	8-7/8 inches

C. Hole shall be cleaned of dust and residue by blowing the hole with dry and oil-free compressed air. Air nozzle shall be inserted to bottom of hole. The holes should also be brushed using a nylon brush to remove dust and other debris which may have been pressed into the walls of the hole.

D. Standing water and frost shall be removed immediately prior to injecting adhesive.

E. Adhesive shall be injected from bulk-loading caulking gun, disposable caulking tubes, or pneumatic dispenser. Adhesive shall be injected using extension on nozzle to reach bottom of hole. Adhesive shall be injected to pre-determined depth which will cause hole to be completely filled after bar is inserted.

F. Bar shall be inserted and slightly rotated to ensure adhesive completely surrounds bar.

G. Adhesive displaced from hole shall be removed immediately.

H. The manufacturer’s installation guidelines for the specific adhesive chosen shall be strictly followed.

3.06 REINFORCEMENT

A. Place reinforcing to ACI recommended tolerances.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by the Engineer.

D. Unless shown otherwise in drawings, place reinforcement to maintain minimum coverages conforming to ACI standard practice for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Welding of reinforcement shall conform to AWS D1.4.

F. Unless otherwise specified on Drawings, reinforcing steel splices shall be lapped conforming to ACI 318, Class B splices.

G. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh plus 2 inches and lace splices with 16-gauge wire. Do not make end laps between supporting beams. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.07 INSERTS

A. Metal inserts such as anchor bolts, sleeves, embedded metals, etc. shall be free of scale, loose rust, oil, grease and other coatings. Remove protective film from cast iron with flame.

B. Ensure that items are accurately positioned and rigidly supported against displacement before placing concrete.

C. The location of anchor and foundation bolts must not vary from the dimensions shown on the Contract Drawings by more than the following:

1. 1/8-inch center to center of any two bolts within an anchor bolt group, where such group is defined as the set of anchor bolts which receives a single fabricated steel shipping piece.

2. 1/4-inch center to center of adjacent bolt groups.

D. Split rib types of waterstops are acceptable at construction joints and isolation (expansion) joints.

E. Secure waterstops in place by wire ties to hog rings. Hog rings to be installed between last rib and edge and spaced at 12 inches on center.

F. Field weld joints in waterstops using indirect heating element.

3.08 JOINTS

A. Joints not shown on Drawings shall be made at locations that will least impair strength of structure, and shall be approved by the Engineer prior to construction.

B. Construction Joints:

1. Keyways at least 1-1/2-inch-deep by width, which is equal to 1/3-member thickness, shall be provided in all construction joints in walls, supported slabs, and between walls and foundation systems.

2. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints. Do not continue reinforcement through sides of strip placements.

3. Concrete slabs on grade shall be poured in strip pattern shown on the Drawings.

4. Roughen surfaces of set concrete at all joints. Clean surfaces of laitance, coatings, loose particles, and foreign matter. Roughen surfaces in a manner to expose bonded aggregate uniformly. Apply approved bonding adhesive or cement grout. Bonding cement grout shall be evenly spread and shall consist of 1-part cement and two parts fine aggregate. Fresh concrete shall be placed before grout or bonding adhesive has obtained initial set. Grout shall be approximately 2-inch-thick in walls.

C. Unless otherwise shown, provide isolation joints in slabs on grade at all points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, equipment bases and elsewhere as indicated.

D. Expansion Joints:

1. Provide preformed expansion joints as shown on Drawings or otherwise required.

2. Expansion joint material shall be 1/2 inch in thickness, unless otherwise indicated.

3. Concrete edges at expansion joints subject to vehicular traffic shall be tooled to a 1/8-inch radius.

4. When sealed expansion joints are called for on the Drawings, pourable approved joint sealants shall be placed along top edges of expansion joints per manufacturer's instructions.

E. Control Joints for Slabs:

1. Control joints shall be located and constructed as shown on the Drawings.

2. Within 24 hours of finishing concrete, cut joints to a depth of 1/4 slab thickness when it is firm enough to resist raveling, tearing, or dislodging of aggregates.

F. Clean joints thoroughly with compressed air, wire brushing, or sandblasting.

G. Fill joints with specified joint filler.

3.09 CONCRETE SCHEDULES

A. Unless indicated otherwise, concrete shall be furnished as follows:

Class A: Reinforced concrete structures and fill in manholes and chambers.

Class B: Buried pipe, saddles, and cradles, pipe bedding, pipe encasements, and mudmats.

3.10 PLACING CONCRETE

A. General - Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.

B. Do not place concrete on frozen ground, mud, or debris. Dampen subgrade prior to placing concrete slabs on grade where vapor barrier is not required.

C. Inspection - Before placing concrete, inspect, and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Where necessary, notify other trades to permit installation of their work.

D. Convey concrete from the mixer to the place of final deposit by methods which will prevent the loss or separation of the materials:

1. When concrete placing is interrupted for more than 1/2 hour, place a construction joint.

E. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Avoid unplanned cold joints. Alternate equipment shall be immediately available for use in the event that primary placing equipment or system breaks down.

F. Use internal vibration to consolidate. Size at least one vibrator to work around closely spaced reinforcing. Provide a standby vibrator whenever working less than three vibrators in the pour. All equipment and procedures used to consolidate concrete shall comply with ACI 309R.

G. Concrete shall be thoroughly consolidated by vibrating, spading, rodding, or forking so that concrete is thoroughly worked around reinforcement and embedded items, and into corners, angles of forms, eliminating air and stone pockets.

H. Hot Weather Concreting – Follow recommendations of ACI 305R for preparation, placing, protection and curing during hot weather.

I. Cold Weather Concreting – Follow recommendations of ACI 306R for preparation, placing, protection and curing during cold weather.

J. Contractor shall keep good thermometer at Site for monitoring air or concrete surface temperature.

K. Where saw cutting and removal of existing concrete walls, slabs, etc. exposes the ends of reinforcing steel bars, the Contractor shall coat the exposed concrete surface with the specified epoxy coating.

1. Prior to application of the epoxy coating, the concrete surface to be coated shall be roughened and cleaned of all loose materials and dust.

2. Epoxy coating shall be water based rebar coating agent, moisture insensitive, 3-component, epoxy-modified cementitious product.

3. Application methods and thickness of coating shall be as recommended by the manufacturer.

L. Apply the specified bonding agent per the manufacturer's instructions at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

1. Prior to application of the bonding agent, the existing concrete surfaces to be coated shall be roughened and cleaned of all loose materials and dust, thus exposing the aggregate to provide a mechanical bond in addition to the chemical bond provided by the bonding agent.

2. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces prior to beginning finishing operations.

3.11 DEFECTIVE CONCRETE

A. Defective concrete is defined as concrete in place which does not conform to specified design strength, required percent air, shapes, alignments and elevations, as shown on the Drawings and/or which presents faulty surface areas. Evaluation and acceptance of concrete shall conform to ACI 318, ACI 301, and ACI 350 as applicable.

B. All defective concrete shall be removed and replaced in a manner meeting with the Engineer's approval, or should surface imperfections only occur, may be patched at the discretion of, and in a manner satisfactory to the Engineer; however, permission to patch the Work shall not be considered as a waiver of the Engineer's right to require complete removal and replacement of such defective Work should the patching fail to satisfactorily restore the required quality and appearance of the Work. All such Work shall be performed at the Contractor's expense, without extension of time.

C. If for any reason, in the opinion of the Engineer, the testing of any section of the completed structure is necessary, a superimposed load shall be applied by the Contractor and the test conducted in accordance with the current Building Code at the Contractor's expense irrespective of the results of the tests. In cases where failure is declared, the Engineer shall have the authority to order the defective construction removed. All expense of removing such defective construction and substituting new construction, including expense of removing and replacing the Work of others, or protecting and repairing the Work of others, shall be borne by the Contractor.

3.12 CURING

A. General - Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations.

B. Begin curing after finishing concrete but not before free water has disappeared from concrete surface in accordance with ACI 308 "Standard Practice for Curing Concrete" subject to the requirements specified herein.

C. Cure concrete at least five days at concrete temperatures above 70 degrees F or at least seven days at concrete temperatures between 50 degrees F and 70 degrees F. Maintain

concrete temperature above 50 degrees F during the curing period. Tanks and other liquid retaining structures shall be cured for a minimum of 10 days.

D. For exposed surfaces, utilize one of the following methods:

1. Membrane Curing Compound - Apply in two coats at right angles to each other upon completion of the Work - each one in accordance with the manufacturer's instructions. Compounds must not be used on surfaces when surface treatments, such as tile, additional concrete, paint, liquid hardeners, and adhesive coatings are specified unless the compound is known not to interfere with adhesion.

2. Sheet Curing Materials - Place materials upon completion of the finishing work. Lap edges 6 inches and seal to create a moisture barrier that must remain intact for the duration of the curing period.

3. Sprinkling, Soaking, or Ponding - Maintain surfaces continuously wet for the duration of the curing period as described above.

E. If formed surface is exposed during the curing period, treat the surface as an exposed surface for the remaining duration of the curing period.

3.13 FINISHING SURFACES

A. Formed Surfaces - Finishing of formed surfaces shall be in accordance with the requirements of Section 5, ACI 301 subject to the following provisions specified herein:

1. Do not remove forms and shoring until the concrete has cured sufficiently to carry its own weight and remain in place without deformation. Remove forms with care to prevent spalling. Reshore concrete carrying superimposed load until the concrete has attained design strength.

2. Inspect honeycombed areas. Replace areas as directed by the Engineer.

3. On exposed vertical unpainted surfaces, building interior, and to 6 inches below grade on building exterior, remove fins and projections, fill holes, and produce smooth-rubbed finish per ACI 301 by wetting and rubbing surfaces with carborundum brick or other abrasive until uniform color and texture are produced.

4. Horizontal surfaces, such as at tops of walls, pedestals, horizontal offsets and similar unformed surfaces occurring adjacent to formed surfaces, shall be struck off smooth and finished with a texture matching the adjacent formed surfaces.

B. Slabs and Horizontal Surfaces - Finishing of unformed surfaces shall be done in accordance with the requirements of Section 5 of ACI 301 and Chapter 8 of ACI 302:

1. All slabs, whether receiving additional finishes or not, shall receive a float finish when concrete has stiffened sufficiently to permit the operation of a power drive float and all surface water has disappeared. Check and level slab surface to obtain a Class A finishing tolerance per ACI 117.

2. Interior slabs not receiving tile shall be given a hard trowel finish as follows:

a. Follow initial finishing with a steel trowel worked flat to produce a fine, non-slip, sandy texture.

b. Follow the first steel troweling with a second steel troweling to produce a dense, smooth surface after the surface has become hard enough to give a ringing sound from the trowel.

c. Retool joints and edges as required.

3. Exterior slabs and concrete stair treads shall be given a non-slip broom finish with scored texture perpendicular to main traffic route. Retool joints and edges.

C. Roadway Repairs and Walkways:

1. Float Finish - Begin floating when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Finish surfaces to true planes within a tolerance of 1/4 inch in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture.

2. Final Tooling - Tool edges of paving and joints formed in fresh concrete with a jointing tool to a radius of 1/4-inch Repeat tooling of edges and joints after applying surface finishes. Eliminate tool marks on concrete surfaces.

D. Tanks and Other Liquid Retaining Structures: Finishing for exposed surface shall be in accordance with the requirements of ACI 350, ACI 301 and ACI 302 subject to the following requirements:

1. Slabs - Floated finish.

2. Interior Formed Surfaces - Grout-cleaned finish.

3. Exterior Formed Surfaces - Grout-cleaned finish to 6 inches below grade.

4. Other Formed Surfaces - As-cast finish.

3.14 REMOVING FORMS

A. General - Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the Work, may be removed after curing at not less than 50 degrees F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days or until concrete has attained at least 80% of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimen's representative of concrete location or members. Construction loads shall not exceed 80% of design live load until 28 days after concrete placement.

C. Form-facing material may be removed four days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

3.15 REUSING FORMS

A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to the Engineer.

3.16 CONCRETE REPAIRS AND REPLACEMENT

A. Remove and replace, at Contractor's expense, any concrete that was part of the Work and that is broken, damaged, or defective, or does not meet the requirements of this Section.

B. Protect concrete from damage. Exclude traffic from slabs-on-grade and roadway/walkway paving for at least 14 days after placement. When construction traffic is permitted, maintain slabs and paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Patching Defective Areas - Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to the Engineer.

D. Mix dry-pack mortar, consisting of one-part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.

1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.

2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

E. Repaired Formed Surfaces - Remove and replace concrete having defective surfaces if defects cannot be repaired to the satisfaction of the Engineer. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.

1. Repair concealed formed surfaces containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.

F. Repairing Unformed Surfaces - The Contractor shall test unformed surfaces such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.

1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01-inch-wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.

2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.

3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

G. Repair isolated random cracks and single holes 1 inch or less in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry-pack before bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

PART 4 SPECIAL PROVISIONS

Not Used.

END OF SECTION

SECTION 03310
GROUT

PART 1 GENERAL

1.01 SCOPE

A. This Section includes non-shrink cementitious and epoxy grouts.

B. Masonry grout and bonding grout are specified in other Sections.

C. Additional product requirements are specified in Section 01350.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. Contractor shall indicate variances from requirements of Contract Documents.

b. Product literature.

c. Material certifications of ASTM standard and grade.

d. Laboratory test reports for grout compressive strength tests.

2. Information for the Record:

a. Manufacturer's mixing, placing, and curing instructions.

1.03 PRODUCT HANDLING

A. Environmental limitations specified by manufacturer shall be observed. Heated enclosures shall be provided as required.

PART 2 PRODUCTS

2.01 NON-SHRINK GROUT

A. Grout shall be prepackaged, nonmetallic, noncorrosive, non-staining cementitious grout. Grout shall remain volume stable in both dry and wet conditions and provide a minimum of 95% effective bearing area.

B. Grout shall conform to ASTM C1107 Grade C when tested at fluid consistency of 25 seconds or more per ASTM C939 at temperature extremes of 45 degrees F and 90 degrees F and a working time of 30 minutes. Metallic grouts are prohibited.

C. Non-shrink property shall not be based on any gas generating additives such as aluminum oxide.

D. Minimum compressive strength: 1 day 3500 psi
(2-inch cube cured at 70 degrees F) 7 day 5500 psi
28 day 7500 psi

E. Non-shrink grout shall be Five Star "Fluid Grout 100", Master Builders "Masterflow 928 Grout", or equal.

2.02 EPOXY GROUT

A. Grout shall be non-shrink prepackaged epoxy grout which will achieve a minimum effective bearing area of 95%.

B. Max unrestrained linear shrinkage: 0.0005 inch per inch (ASTM C531)
Max coefficient of expansion: 27 x 10-6 inch/inch/degree F
Minimum compressive strength: 7 day 11,500 psi
(2-inch cube cured at 70 degrees F)

C. Epoxy grout shall be Five Star "HP Epoxy Grout", Master Builders "Masterflow 648", or equal.

2.03 MIXING

A. Grout shall be mixed with mechanical mixers in accordance with manufacturer's written instructions. A mortar mixer with moving blades shall be used to thoroughly blend the potable water into the mix.

B. Water used to mix non-shrink cementitious grout shall be potable. Water shall be added in just sufficient quantity to obtain desired consistency, but shall not exceed manufacturer's maximum recommendations. Grout shall be used in as stiff a consistency as possible. Grout shall not be re-tempered by addition of water. Grout manufacturer shall be consulted when additional flowability is required.

C. Materials other than those supplied by grout manufacturer shall not be added to grout.

D. Cementitious grout shall be mixed close to its placement site, and transportation and placement time shall be limited to less than 15 minutes. Mixed grout temperature shall be held between 45 degrees F and 70 degrees F using ice or hot water as required.

E. Epoxy Grouts - ingredients are prepackaged and pre-measured and shall be completely mixed in accordance with the manufacturer's instructions.

PART 3 EXECUTION

3.01 PREPARATION

A. Concrete to receive grout shall have minimum compressive strength of 3000 psi. New concrete shall be cured as specified prior to placing grout.

B. Defective or deteriorated concrete shall be removed. Laitance, grease, oil, and other substances which prevent bond shall be removed. Concrete shall be roughened by chipping, sand-blasting, or other mechanical means to assure the bond of the grout to the existing concrete.

C. Oil, grease, and dirt shall be removed from the underside of base plates and bearing plates. Air relief holes shall be provided in base plates to eliminate air entrapment.

D. Concrete to receive non-shrink cementitious grout shall be saturated with water for 24 hours prior to grout placement. Concrete to receive epoxy grout shall be dry.

E. Forms shall be constructed of coated wood or steel. Forms shall be constructed and anchored to resist hydraulic head of grout and shall be leak-tight when fluid grouts are used.

F. Unless otherwise specified, non-shrink, cementitious grout shall be used under column and equipment bases. Equipment such as stamping machines, compressors, crushers, etc., involving high impact or vibration, and applications requiring chemical resistance, shall use non-shrink epoxy grouts.

G. When placing more than 5.0 cubic feet of epoxy grout, contact the manufacturer for recommendations.

3.02 PLACING

A. Grout shall be placed in accordance with manufacturer's instructions.

B. Grout shall be placed from only one side of form to avoid air entrapment. Grout shall be placed in a continuous operation to avoid cold joints under base plates. Spaces and cavities below top of baseplate shall be completely filled without voids or air pockets.

C. Grout shall be rodded or vibrated to remove entrapped air.

D. Grout exposed to view shall be finished smooth after initial set.

E. Unless otherwise shown, cementitious grouts shall be placed in minimum 1 inch thickness and epoxy grouts shall be placed in minimum 2-inch thickness. Manufacturer's recommendations for minimum thicknesses required for specific situations shall override these specified minimum values.

F. If the grout extends up the side of a baseplate, it must be cut back to the lower level of the baseplate to avoid cracking of the grout due to possible movement of the baseplate caused by temperature changes, vibrations, etc.

3.03 CURING

A. Grout shall be cured and protected in accordance with manufacturer's instructions.

B. Non-shrink cementitious grout shall be wet cured for minimum of 7 days.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

SECTION 05500
METAL FABRICATIONS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes furnishing, shop detailing, shop coating, fabricating, delivering, and installing all miscellaneous metals and accessories needed to complete installations as shown on the Drawings, whether or not specifically listed herein, except those items specified in other sections. This section includes design engineering where specifically called for by this Section.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

   a. Shop Drawings shall indicate:

      1) Types of materials with ASTM designations.

      2) Plan layouts, elevations and sections.

      3) Connection details.

      4) AWS weld designations and welding procedure.

      5) Surface preparation and shop coatings.

      6) Accessory materials.

   b. Product literature for all materials and accessories required to complete the installation of the items covered in this Section.

   c. Samples representative of materials and finished products .

   d.

2. Information for the Record:

   a. Welder qualification certificates.

   b. Inspection Reports and test certificates.

   c. Required field measurements.

   d. Manufacturer’s installation instructions.

1.03 QUALITY ASSURANCE

A. Standards - Metal fabrications shall be designed, fabricated, and installed in accordance with following standards.

1. "Structural Welding Codes", American Welding Society.
2. "Specifications for Structural Steel Buildings" as approved by American Institute of Steel Construction.
3. "Specifications for the Design of Cold-Formed Steel Structural Members", American Iron and Steel Institute.
4. "Specification for the Design of Cold-Formed Stainless Steel Structural Members", ASCE 8.
5. "Code of Standard Practice for Steel Buildings and Bridges", as approved by American Institute of Steel Construction.
6. "Specification for Aluminum Structures", Aluminum Association.
7. "Specification for Structural Joints Using High Strength Bolts" as approved by the Research Council on Structural Connections of the Engineering Foundation.
8. "Surface Preparation Specification," Steel Structures Painting Council (SSPC).

B. Welders, welding operators, and tack welders shall be qualified by tests as prescribed in AWS Structural Welding Code.

1. REserve

1.04 DELIVERY, STORAGE, AND HANDLING

A. Contractor shall exercise particular care in handling materials to prevent damage to shop applied finishes and coatings.

B. Material shall be stored in a manner to prevent bending or warping. Material shall be stored away from uncured concrete and masonry.

C. Materials to be embedded in concrete or masonry shall be delivered in sufficient time to permit proper placement.

D. Fastening materials shall be delivered and stored in unopened boxes with labels clearly identifying fastener material, grade, and manufacturer. Only those fasteners which can be installed in same day shall be removed from storage.

1.05 PROJECT CONDITIONS

A. Prior to fabrication, Contractor shall field measure new and existing structures when required for proper fit.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel (Carbon Steel):

1. Wide Flange Shapes (W) - ASTM A992.
2. Other Rolled Shapes, Plate, and Bar - ASTM A36 or ASTM A572, Grade 50 as indicated on the Drawings. Where no indication is given, use ASTM A36.
3. Sheets - ASTM A570, Grade 36.
4. Hollow Structural Sections (HHS), tube and pipe - ASTM A500, Grade B.
5. Pipe - ASTM A53, type E or S, Grade B.
6. Floor and Tread Plate - ASTM A786 using ASTM A36 steel.

B. Stainless Steel:

1. Unless indicated otherwise stainless steel shall be AISI Type 304, except AISI Type 304L shall be used for welded construction. The minimum yield strength shall be 30,000 ksi.
2. Sheet, Strip, Plate, and Flat Bar - ASTM A666, annealed.
3. Round Bar and Structural Shape - ASTM A276, condition A.
4. Pipe and Tube - ASTM A312 or ASTM A554, annealed.
5. Floor and Tread Plate - ASTM A793.

C. Aluminum:

1. Unless specified otherwise aluminum shall be alloy 6061-T6.
2. Sheet and Plate - ASTM B209.
3. Rod and Bar - ASTM B211 or B221.
4. Pipe and Tube - ASTM B210 or ASTM B429.
5. Floor and Tread Plate - ASTM B632.

2.02 ASSEMBLY AND ERECTION FASTENERS

A. Bolts and Nuts:

1. High strength bolts - ASTM A325, Type 1 or ASTM A490, Type 1. When no indication is given, ASTM A325 shall be used.
2. Stainless Steel - ASTM F593, AISI Type 304.
3. High strength and stainless-steel bolts shall bear a distinctive head marking identifying bolt grade or material.

4. Nuts - Heavy hex style, ASTM A563, Grade C, for plain A325 high-strength fasteners and DH for galvanized bolts. For A490 bolts, heavy hex nuts conforming to ASTM A194 for Grade 2H, or ASTM A563 Grades DH or DH3.

B. Lock Nut - Prevailing torque type, IFI 100, Grade A.

C. Carbon Steel Washers - ASTM F436 plain with plain bolts and galvanized with galvanized bolts.

D. Lock Washer - Spring type of same material and coating as bolt.

E. Headed Studs - ASTM A108, Grade 1010 through 1020, and AWS D1.1, Section IV.

F. Screws:

1. Carbon Steel - SAE Grade 2, zinc plated.

2. Stainless Steel - IFI 104, Grade 304.

G. Nuts and washers of same finish and material as bolts shall be furnished

2.03 ANCHOR BOLTS

A. General Requirements:

1. Bolt and Stud Material:

2. Carbon Steel - ASTM F1554 Grade 36, unless noted otherwise.

3. Stainless Steel - ASTM F593, AISI Type 304.

4. Heavy hex nuts and washers of same material and coating as anchor shall be furnished. Where lock nut is indicated, prevailing torque type lock nut shall be furnished in addition to standard nut.

5. Anchor Bolt Sleeves:

6. Steel Pipe - ASTM A501, ASTM A120, or ASTM A53.

7. Plastic - Wilson “Ankor Shield” or equal.

B. Cast-In Anchor Bolt (Type A):

1. Sufficient thread length shall be provided to permit installation of nuts on both sides of concrete form or template.

2. Anchor embedment, and hook dimension shall be as shown on Drawings.

3. Where sleeve is shown, sleeve shall be fabricated from material indicated above.

C. Adhesive Anchor (Type B):

1. Adhesive – 100% solids, 100% reactive epoxy (ester-based resins are not permitted) in conformance with ASTM C881, Type IV, Grade 3, Class B and C. Minimum bond strength to concrete, per ASTM C882, shall be 1800 psi at 7 days. Adhesive shall be mixed in accordance with manufacturer’s

recommendations. The adhesive shall be formulated to withstand the maximum allowable published load permanently without creep or failure.

2. Where adhesive anchor is installed in hollow masonry, stainless steel screen tubes shall be furnished to contain adhesive until stud is inserted.

3. The anchor rods shall be threaded for entire length. Carbon steel rods shall conform to ASTM A193 B7 (high strength) and stainless-steel rods shall conform to AISI 304.

4. Stud shall be threaded full length.

5. Adhesive anchors shall be type “HIT-RE-500-V3” manufactured by Hilti, or equal. All formulations of the “Power-Fast Epoxy” as manufactured by Powers/Rawl shall not be used.

D. Expansion Anchor (Type C):

1. Wedge Type Anchors - FS A-A 1923A, Type 4.

2. All components shall be of same material.

3. Expansion anchors shall be type “Kwik Bolt TZ” manufactured by Hilti, or equal.

E. Sleeve Masonry Anchor (Type D):

1. Sleeve Type Anchors - FS FF-S-325, Group II, Type 3, zinc plated carbon steel.

F.

2.04 RESERVED

2.05 RESERVED

2.06 WELDING

A. Carbon Steel:

1. Welders, welding operators, and tack welders shall be qualified by tests as prescribed in AWS Structural Welding Code.

2. Welding shall be performed using only prequalified joint details in accordance with AWS Structural Welding Code.

3. Welding electrode shall conform to the requirements of AWS D1.1 and table 3.1 therein.

4. Welded fabrications which will be exposed to weather, submerged, or subject to sewage spray shall be continuously welded.

5. All welding processes and procedures and joint details shall be in accordance with the requirements of AWS D1.1. Weld quality shall conform to Section 8 of AWS D1.1.

B. Stainless Steel:

1. Stainless steel shall be welded with inert gas shielded process (GTAW, GMAW, or PAW). Inert gas protection shall be provided to top and under or backside of weld to ensure protection from atmospheric contamination.

2. Filler metal shall be extra low carbon (ELC) of appropriate type for base material being welded.

3. Residue, oxide, and heat stain in heat affected zone shall be removed.

C. Aluminum:

1. Aluminum shall be welded by process which does not require the use of welding flux.

2. Filler metal shall be as recommended by AA and AWS for base material and welding process used. Filler metal shall be selected to minimize crack sensitivity of weldment and to minimize discoloration of weldment on items to be anodized.

D. Welding shall be performed in such a manner to prevent warping and distortion.

E. Butt joints shall be made with full penetration welds. Weld reinforcement on back side shall be smooth, uniform, and no more than 1/16 inch in height.

F. Rough welds shall be ground to remove sharp edges, undercuts, pinholes and other irregularities. Chipping is permitted to remove sharp edges if followed by welding. Overgrinding, which would result in decreasing metal thickness or integrity of weld beyond limits of good welding practice shall be avoided.

G. Weld spatter shall be removed by chipping and grinding as required. Use of an anti-spatter coating applied adjacent to weld area prior to welding is permitted.

2.07 FABRICATION

A. Work shall be fabricated straight and true, free from warpage or other defects and assembled in a first-class workmanlike manner. Joints, copes, miters, and corners shall be accurately cut, machined, filed, and fitted with best methods as required for fabrication.

B. Work shall be fabricated as shown on approved Shop Drawings. Removable parts or members shall be carefully fitted and secured by screw fastenings or other methods as may be required.

C. Work shall be fabricated in as large as sections as practicable to minimize field connections. Field connections shall be designed and constructed in most practical locations for strength, appearance, and ease of installation. Field connections shall be mechanically fastened unless field welding is shown, specified, or permitted by Engineer.

D. Holes and other provisions for field connections shall be accurately located. Connections shall be shop checked for proper fit. Connection materials shall be match-marked when required for proper installation.

E. Holes produced by flame cutting shall be ground smooth.

F. Sharp edges of flame cut or sheared carbon steel fabrications shall be removed by power grinding.

G. Carbon steel surfaces to be coated or galvanized shall have gouges, handling marks, deep scratches, metal stamp marks, slivered steel and other surface flaws repaired. Surface flaws shall be repaired by welding and grinding as required.

2.08 SHOP COATING

A. Aluminum:

1. Anodizing - Where specified, provide Architectural Class I anodic coating, applied after fabrication.

2. Surfaces which will be in contact with concrete, masonry, or dissimilar metals shall receive a heavy coat of coal tar paint, Bitumastic Super Service Black, or equal.

B. Carbon Steel:

1. Steel fabrications wholly embedded in concrete or masonry and with a minimum of 2 inches of concrete cover shall be abrasive blasted in accordance with SSPC SP-6, but shall not be coated. Exposed portions of partially embedded steel shall be shop coated to a point 4 inches below the concrete surface.

2. Galvanizing - Component shall be hot dip galvanized after fabrication in conformance with ASTM A123. Threaded parts and hardware shall be galvanized in conformance with ASTM A153 or zinc-plated in conformance with ASTM B695.

3. Painting - Unless specified otherwise, non-galvanized fabrications shall be shop primed per Section 09900.

a. Surfaces which will be inaccessible for field painting after installation shall receive two coats of primer.

b. Contractor shall ensure primer is compatible with specified field coatings.

2.09 RESERVED

2.10 RESERVED

2.11 RESERVED

2.12 RESERVED

2.13 RESERVED

2.14 RESERVED

2.15 RESERVED

2.16 RESERVED

2.17 RESERVED

2.18 RESERVED

2.19 PIPE BOLLARDS

A. Metal pipe bollards shall be constructed as shown on the Drawings.

B. Metal pipe shall be hot dipped galvanized, unless noted otherwise on Drawings.

C. Plastic bollard guards shall be provided when specified in Part 4.

PART 3 EXECUTION

3.01 ERECTION

A. Metal fabrications shall be installed in accordance with manufacturer's instructions and as shown on Drawings.

B. Fabrications shall be installed level and plumb or as otherwise shown on Drawings. Shims shall be furnished when required.

C. Components shall be assembled as indicated on Drawings. Light drifting is permitted to draw parts together, but drifting to match unfair holes is not permitted. Where holes do not match, holes may be reamed slightly using a tapered reamer. Enlarging holes by burning is prohibited.

D. Contact surfaces between members and areas adjacent to bolt holes shall be free of dirt, oil, loose scale, burrs, pits, and other defects that would prevent proper seating and connection of the members.

E. Galvanized or anodized material shall not be field bent, cut, welded, or otherwise altered. Material so altered will be considered defective.

3.02 ASSEMBLY AND ERECTION FASTENER INSTALLATION

A. Washers shall be installed under turned element of bolts. Hardened washers shall be used for high strength and alloy bolts. Beveled washers shall be installed when bearing surface of the bolted parts have a slope of 1:20 or greater with respect to the bolt axis.

B. Fastener threads which have been contaminated with dirt shall be cleaned and lubricated.

C. Stainless Steel - Anti-seizing lubricant shall be applied to threads prior to installation.

D. Bolts shall be tightened progressing systematically from stiffest part of connection toward free edges.

E. Bolted connections shall be snug-tightened-joints, unless noted otherwise. All connected steel plies shall be free of dirt, oil, lacquer and burrs, and shall be in firm contact prior to bolting.

F. High strength and alloy bolts shall not be reused once tightened beyond snug-tight.

G. For bolted connections, at least one full thread shall project beyond the nut when tightened.

3.03 ANCHOR BOLT INSTALLATION

A. Non-cast-in type anchors shall be installed in predrilled holes of size specified or as recommended by manufacturer. Anchors shall be embedded to depth indicated below unless shown otherwise on the Drawings.

B. Anchor bolted connections shall be snug-tightened- in accordance with “Specification for Structural Joints Using ASTM A325 or A490 Bolts” as approved by the Research Council on Structural Connections of the Engineering Foundation or as otherwise specified by anchor manufacturer.

C. Expansion Anchor:

1. Unless indicated otherwise, expansion anchors shall have an effective embedment as follows:

Stud Diameter	Minimum Embedment
1/4 inch	2 inches
3/8 inch	2 inches
1/2 inch	3-1/4 inches
5/8 inch	4 inches
3/4 inch	4-3/4 inches
1 inch	6 inches

2. Unless indicated otherwise, expansion anchors shall be spaced as follows:

Minimum center to center spacing: 2 times embedment.

Minimum edge distance: 3 times embedment.

3. Unsound concrete shall be reported to Engineer.

D. Adhesive Anchor:

1. Adhesive anchors shall be placed in holes larger than stud diameter using a rotary percussion hammer and carbide bit. Hole diameters shall be as recommended by manufacturer for each specific anchor diameter.

2. Unless indicated otherwise, Adhesive anchors shall have an effective embedment as follows:

Stud Diameter	Minimum Embedment
3/8 inch	3-3/8 inches
1/2 inch	4-1/2 inches
5/8 inch	5 5/8 inches
3/4 inch	6-3/4 inches
7/8 inch	7-7/8 inches
1 inch	9 inches

3. Preparation Procedure:

a. Hole shall be cleaned of dust and residue by blasting with dry and oil-free compressed air. Air nozzle shall be inserted to bottom of hole.

b. Sides of hole shall be cleaned with a nylon bristle brush.

c. Compressed air blast shall be repeated.

4. Standing water and frost shall be removed immediately prior to injecting adhesive.

5. Adhesive shall be injected from bulk-loading caulking gun, disposable caulking tubes, or pneumatic dispenser. Adhesive shall be injected using extension on nozzle to reach bottom of drilled hole.

a. Anchoring to Concrete - Nozzle shall be inserted to back of hole and adhesive dispensed while slowly withdrawing nozzle. Hole shall be filled to pre-determined depth which will cause hole to be completely filled after stud is inserted.

b. Anchoring to Masonry - Screen tube shall be filled with adhesive while slowly withdrawing nozzle. Screen tube shall be carefully inserted into drilled hole.

6. Stud shall be pushed into adhesive with gentle, uniform pressure while slightly rotated to ensure adhesive completely surrounds stud. Stud shall be inserted to full depth of hole.

7. Adhesive displaced from hole shall be removed immediately. Adhesive which has hardened on projecting portion of stud or on concrete surfaces shall be removed.

8. Nut shall not be tightened nor load applied until adhesive has fully cured as recommended by manufacturer.

9. Threaded anchors shall have at least one full thread projecting beyond the nut when tightened.

3.04 FASTENER AND ANCHOR SCHEDULE

A. Unless shown or specified otherwise, fasteners and anchors shall be as follows:

Base Metal	Fastener Metal and Coating
Stainless steel	Stainless Steel
Aluminum	Stainless Steel
Galvanized steel	Galvanized or zinc plated carbon steel
Field painted or uncoated carbon steel	Unfinished or zinc plated carbon steel

B. Where a connection involves dissimilar base metals, fastener shall be as required for most corrosion resistant base metal in connection, or dielectric material shall be installed.

C. Anchors bolts and fasteners in submerged applications shall be stainless steel.

D. Where anchor type is not shown or specified, anchor furnished shall be suitable for substrate material and specific application. Adhesive anchors are not permitted for anchoring to vertical or overhead surfaces inside of buildings or other fire rated locations.

Substrate Material	Suitable Anchor Type
Concrete	A, B, C
Solid or Grouted Masonry	A, B, D
Hollow Masonry	B, D

3.05 FIELD WELDING

A. Field welding when shown, specified, or otherwise permitted by Engineer shall be performed in accordance with the requirements specified for shop welding.

B. Areas adjacent to field welds shall not be shop primed. Primer shall be applied after welding.

3.06 COATING REPAIR

A. Welds, bolts, and damage to shop applied coatings shall be touched-up with same or equivalent materials used in original coating.

B. Minor scratches or defects in galvanized coating may be repaired with zinc-rich paint in accordance with ASTM A780 at Engineer's discretion.

C. Repair of anodized coatings in field is not permitted. Damaged materials shall be removed and re-anodized.

3.07 CLEANING

A. Metal fabrications shall be cleaned with mild detergents prior to final acceptance. Steel wool, harsh abrasives, or alkaline or acid cleaners are not permitted.

3.08 QUALITY CONTROL INSPECTION AND TESTING

A. The Contractor shall employ a laboratory to perform the following inspections and testing verifications: Where pretensioned or slip critical connections are indicated refer to Section 05120 for additional inspection requirements.

1. At the start of Work, the inspector at the Site of the project shall:

   a. Verify that the material identification markings for structural members, high strength bolts, nuts and washers correspond to the appropriate ASTM designations.

   b. Verify that on-site welders designated by the Contractor are certified to perform welding

   c. Verify that the proper welding electrodes, equipment and procedures are being utilized

2. If inspections determine that a specific item does not comply with the Contract Documents the contractor shall make corrections until the item passes the inspection. The cost of corrections and additional inspections shall be paid for by the Contractor.

PART 4 SPECIAL PROVISIONS

4.01 DISSIMILAR MATERIALS

A. Where dissimilar materials come into contact, use neoprene washers, spacers, gaskets or other Engineer approved materials between them to provide insulation against electrolytic action.

4.02 CRITERIA FOR BASE METAL REPAIR OF STRUCTURAL STEEL

A. This criteria shall cover damage induced to existing structural steel during or subsequent to installation of steel. Injurious imperfections, such as voids and gouges, shall herein be defined as a base metal discontinuity which results in a reduction of the cross-sectional area of a member, and which exceeds the limiting depths specified below for various thicknesses of material. Except for discontinuities of 1/32-inch and less in depth which are acceptable without any repair, base metal shall be conditioned for the removal of

discontinuities by chipping or grinding. Weld repair is not required, provided the excavated area is well faired without abrupt changes in contour and the depression does not extend below the rolled surface by more than:

1. 1/32 inch for material less than 3/8 inch thick.
2. 1/16 inch for material 3/8 inch to 2 inches (inclusive) thick.
3. 1/8 inch for material over 2 inches thick.

B. Voids and gouges greater in depth than the limits given above and all cracks and tears are considered injurious and shall be weld repaired using the methods given below; however, in no case shall the depth of excavations exceed 30% of the base metal thickness without written approval of the Engineers. Prior to welding, the excavations shall be visually (and for cracks and tears, magnetic particle or liquid penetrant) examined to insure complete removal of defects. Excavations shall have a minimum root radius of 1/8 inch, a minimum included angle of 45 degrees F on the cross section, and shall be gradually tapered up to the base metal surface at the ends. Repair welding shall be performed in accordance with the parameters of an AWS D1.1 qualified backing bar weld procedure. Completed surfaces of all repair welds shall be visually examined to the acceptance criteria of AWS D1.1 Section 8.15.

4.03 CRITERIA FOR REPAIR OF WELD DEFECTS AND DAMAGED WELDS

A. Repair of damage or discontinuities in previously completed welds shall be in accordance with the criteria outlined below. In conjunction with the requirements outlined in weld procedure W200A, defects in welds shall be removed by chipping, arc-gouging, or grinding until sound metal is reached. Removal of indications such as cracks or tears, shall be verified by magnetic particle or liquid penetrant examination. Removal of other indications or damaged areas such as nicks, gouges or undercuts, shall be verified by visual examination. Oxygen gouging, where required, is acceptable providing welding preheat is applied. Rewelding shall be performed in accordance with the procedure originally used to make the weld, or an alternate procedure approved in writing by the Engineer. Removal of attachment welds, when required, shall avoid removal of base material. Any remaining rough edges shall be ground flush with the surrounding surface and visually inspected to assure soundness.

4.04 FABRICATOR APPROVAL

A. The fabricator of structural load bearing members and assemblies furnished under this Section, shall be registered and approved to fabricate these products without special inspections per the requirements of the current Building Code Section 1704. The approved fabricator shall submit evidence of such registration at the time that Shop Drawings are submitted. At the completion of production, the approved fabricator shall submit a certificate of compliance to the local building code official stating that the fabrication was performed in accordance with the Contract Documents and the approved Shop Drawings.

4.05 PLASTIC BOLLARD GUARDS

A. Pipe bollards cover shall be a closed top, 1/8-inch-thick HDPE with UV inhibitors and rated for outdoor environment. The bollard cover shall be integrally colored; Owner shall select color. A reflective striping, as specified, shown or required shall be a 3M #680 reflective self-adhesive tape which is compatible with the HDPE cover and exterior rated. The striping pattern and colors, shall be as specified, shown or as required. HDPE covers shall provide for a uniform height of bollards. Contractor shall coordinate bollard cover size with the metal pipe bollard as shown on the Drawings.

END OF SECTION

SECTION 05540
IRON CASTINGS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes manhole covers and frames, inlet grates and frames, stop plank grooves, and other iron castings shown on Drawings.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

   a. Product literature that shall be included; General Specifications, Surface Coating, Anchor Bolts, Machine Bearing Surface.

   b. Independent Shop Drawings shall be submitted for the frame and the cover.

   c. A submittal of a casting schedule that clearly notes either the structure number or in what circumstances the casting is intended to be installed, shall be included, i.e., roadway.

   d. All dimensions for both the frame and the cover/grate shall be included.

2. Information for the Record:

   a. Material certification.

   b. Proof-load test data.

   c. Manufacturer's installation instructions.

   d. Manufacturing Capabilities and Quality Control Measures.

1.03 PRODUCT HANDLING

A. Castings shall be delivered in sufficient time to permit proper placement in pavement and slabs.

B. Castings shall be stored in such a way as to prevent warping prior to installation.

C. Additional product handling requirements are specified in Section 01350.

PART 2 PRODUCTS

2.01 RESERVED

2.02 MANHOLE COVER AND FRAME

A. Castings located in roadways, driveways, or other areas subject to vehicular traffic shall be suitable for heavy-duty service. Other castings shall be suitable for light-duty service.

2.03 INLET GRATE AND FRAME

A. Castings shall be suitable for heavy duty service.

B. Unless indicated otherwise, inlet grate and frame shall be East Jordan No. 7045.

2.04 RESERVED

2.05 PERFORMANCE REQUIREMENTS

A. Castings shall be gray iron conforming to ASTM A48, Class 35.

2.06 FABRICATION

A. Castings shall be free from pouring faults, sponginess, cracks, blowholes, blisters, shrinkage strains, and other defects. Plugging of defective castings is not permitted.

B. Castings shall be true to pattern in form and dimension. Weight of castings shall not vary by more than 5% from published weight. Contractor shall submit invoices showing actual weight of casting as certified by manufacturer.

C. Castings shall have machined bearing surfaces.

D. All castings shall be coated with a non-toxic, nonflammable, water-based, asphalt paint.

E. Lettering shall be cast on covers. Unless indicated otherwise, the manufacturer's name shall be cast in cover.

F. Covers for sanitary sewer manhole shall be solid lids and labeled "SANITARY SEWER".

G. Castings for storm sewer structures shall include the phrases "DUMP NO WASTE" and "DRAINS TO WATERWAYS" with the "eco-fish" symbol. All storm sewer manhole covers shall be vented.

H. Covers shall be furnished with bolts, locks, hinges, perforations, lifting rings, and pick holes as specified, shown on Drawings, or as directed.

PART 3 EXECUTION

3.01 PREPARATION

A. Contractor shall examine surfaces to receive castings and shall report unacceptable conditions to Engineer before proceeding with the Work.

3.02 ERECTION AND INSTALLATION

A. Castings shall be accurately set, aligned, and anchored as shown on Drawings.

B. Castings shall be installed in accordance with manufacturer's instructions or shown on the drawings. If any discrepancies exist, then the more stringent requirements shall take precedence.

PART 4 SPECIAL PROVISIONS

4.01 CONCRETE COLLARS

A. Concrete collars shall be provided for all manholes and valve boxes located in paved areas.

4.02 STANDARD SANITARY SEWER MANHOLE

A. Sanitary Sewer Manhole Castings shall be provided in accordance with the City of Van Wert's Standard Manhole Casting.

END OF SECTION

SECTION 08320
FLOOR DOORS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes furnishing and installing floor doors in the locations shown on the Drawings.

B. Floor doors shall be aluminum interior, exterior diamond plate or interior recessed to receive carpet, composition or resilient flooring specified under other Items.

C. Door arrangement shall be either single leaf or double leaf hinged as shown on the Drawings.

D. Additional product requirements are specified in Section 01350.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

   a. The Contractor shall indicate all variances from the requirements of the Contract Documents.

   b. Manufacturer's literature.

   c. Door Schedule.

   d. Dimensional Drawing.

2. Information for the Record:

   a. Operation and maintenance manuals.

1.03 GUARANTEE

A. The manufacturer shall guarantee proper operation and against defects in material and workmanship for a period of five years from date of shipment. The provisions of this warranty shall not be construed as relieving or reducing the obligations of the Contractor outlined in General Conditions of these Specifications.

PART 2 PRODUCTS

2.01 RESERVED

2.02 RESERVED

2.03 EXTERIOR DOORS

A. Doors shall have channel frames and shall be 1/4-inch aluminum with an anchor flange around the perimeter.

B. Door leaf shall be 1/4-inch aluminum diamond pattern plate reinforced with aluminum stiffeners designed to withstand an H20 load rating and as required to prevent distortion of the leaf when in any position. Doors shall be equipped with heavy forged brass hinges, stainless steel pins, spring operators for easy operation, and automatic hold-open arm with release handle. A snap lock with removable handle shall be provided.

C. A 1-1/2-inch drainage coupling shall be provided in the door frame. Drainage shall be piped by the Contractor to outlet with 1-1/2-inch PVC pipe to drain.

D. Hardware shall be stainless steel throughout.

E. Factory finish shall be mill finish with bituminous coating applied by the manufacturer to the exterior of the frame and all aluminum in contact with concrete.

F. Doors shall be as manufactured by Bilco, Halliday Products or equal.

2.04 ACCESS DOOR FALL PROTECTION

A. Each hatch shall be designed to combine covering of the opening, fall-through protection per OSHA standard 1910.23 and controlled confine space entry per OSHA standard 1910.146.

B. The safety grate shall be made of 6061-T6 aluminum and designed per the “Specifications for Aluminum Structures”, by the Aluminum Association, Inc. 5th Edition, December 1986 for “Bridge Type Structures.”

C. The grating shall be designed to withstand a live load of 300 pounds per square foot. Deflection shall not exceed 1/150th of the span.

D. Grate openings shall allow for visual inspection, limited maintenance, and float adjustments while safety grate fall-through protection is left in place. The grating shall cover the full opening except for a maximum 6-inch width on each end of the opening.

E. Design must assure that the fall-through protection is in place before the doors can be closed, thereby, protecting the next operator.

F. Each grate shall be provided with a permanent hinging system, which will lock the grate in the 90-degree position once opened.

G. Each grate supplied with a locking device (for Owner's padlock) that will prevent unauthorized entry to the confined space. The grating system will allow anyone to make visual inspection and float adjustments without entering the confined space.

H. Grate shall be coated with an OSHA-type safety orange or yellow color, promoting visual awareness of the hazard. The aluminum safety grates shall receive a two-coat, powder coating system, applied by the electrostatic spray process. The base coat is a thermosetting epoxy powder coat finish with a minimum thickness of 2 to 4 mils. The top coat is a mar-resistant, TGIC polyester powder coating with a minimum thickness of 2 to 4 mils. Each coat shall be baked at 450 to 375 degrees F until cured.

I. Welding shall be in accordance with ANSI/AWS D1.2-90 Structural Welding Code for Aluminum.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall install the floor doors in the locations shown on the Drawings. Installation shall be in accordance with the manufacturer's recommendations.

B. Doors shall be modified by the manufacturer as required when necessary to suit the installation shown on the Drawings.

C. Doors shall be installed to open in the direction shown on the Drawings or as ordered by the Engineer.

D. The bituminous coating on door frames shall be touched up by the Contractor if the coating has been damaged.

PART 4 SPECIAL PROVISIONS

4.01 DOOR SCHEDULE

A. All access floor doors shown on the Drawings and scheduled below shall be provided:

Mark	Clear Opening	Type	Location	Loading	Remarks
FD-1	60" x 42"	Floor Door	Franklin Street	H2O	Double Door with Fall Protection
FD-2	30" x 30"	Floor Door	Franklin Street	H2O	Single Door

B. Schedules are not guaranteed to be complete. All floor doors shown on the Drawings or specified shall be furnished and installed by the Contractor whether or not listed in the above schedule.

C. Sizes shown are the clear opening between all frame, strike plates, accessories, brackets, hinges, or structural components.

END OF SECTION

SECTION 09900
PAINTING

PART 1 GENERAL

1.01 SCOPE

A. This Section includes furnishing and application of protective coatings to all wood, concrete, and metal surfaces as specified or as shown on the Drawings.

B. Included in this Section is surface preparation, shop application inspection, and field touch up work as required to provide a complete protective coating system.

C. In general, the Work shall include the field painting of the following:

1. All exposed interior cast-in-place concrete (except floors) above ground floor.
2. All exposed concrete blocks and hollow core precast slabs.
3. All exposed plaster.
4. All exposed wood.
5. All exposed pipe insulation.
6. All exposed piping, including fittings, valves, couplings, flanges, and other in-line accessories.
7. All machinery, pumps, and equipment.
8. All metal surfaces except the following:
   a. Bronze surfaces.
   b. Stainless steel surfaces.
   c. Aluminum or galvanized steel not requiring color coding or otherwise specified to be coated.

D. Additional product requirements are specified in Section 01350.

E. A Coating Schedule appears in Part 4 of this Section.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:
   a. Coating manufacturer's product data and technical literature including:
      1) Catalog number.
      2) General classification.
      3) Coating material analysis.

4) Detailed surface preparation guidelines.

5) Mixing, thinning, and application instructions for each material.

6) Induction time, pot life, viscosity, and drying and curing times for acceptable ranges of temperature and humidity.

b. Abrasive manufacturer's information including:

1) Name, address, and phone number of manufacturer and local supplier.

2) Bulk density.

3) Mohs ranking.

4) Sieve analysis.

5) Chemical analysis including impurities.

6) Free silica content.

7) Grain shape (roundness).

c. Submittals of coatings by a manufacturer not named in these specifications shall include performance criteria on abrasion, adhesion, exterior exposure, hardness, humidity exposure, salt spray (fog), impact, immersion, etc., as applicable, per the appropriate ASTM standards. If requested by the Engineer, the Contractor shall submit manufacturers complete formula for the coatings which are proposed to be furnished. The Engineer may also require the submission, at the Contractor's expense, of test reports from private laboratories showing results of comparable tests on the coatings proposed and the coatings specified.

d. Details of application equipment and procedures.

e. Samples of manufacturer's standard colors.

2. Information for the Record:

a. Certification that materials meet or exceed Specifications and that coating systems are suitable for intended use.

b. Certification that coating systems are compatible with substrate, specified surface preparation, prime coats, sealants and existing finishes.

c. Safety Data Sheets (SDS) for coating materials, thinners, diluents, abrasives, cleansers, and other materials.

d. Schedule of coating work showing each phase and step of Work.

1.03 QUALITY ASSURANCE

A. Standards - Surface preparation, coating, and patching work performed under this Section shall conform to the applicable provisions and recommendations of the following standards.

1. SSPC Steel Structures Painting Manual, Volume 1, “Good Painting Practice.”
2. SSPC Steel Structures Painting Manual, Volume 2, “Systems and Specifications.”
3. SSPC Vis. 1 and 2, visual standards and written guidelines.
4. NACE Coatings and Linings Handbook.
5. Applicable NACE standards and recommended practices including RP0178 and RP0184.

B. Field Mock-ups - Where specified in the Coating Schedule, a field mock-up shall be done prior to performing the required Work.

1. Field mock-ups shall be a minimum of 4 square feet in area, in a location chosen by the Owner or his representative.
2. The mock-ups will serve as a standard of acceptance for applicable coating work under this Contract.
3. The coating manufacturer’s representative will be available to advise the Contractor.
4. Step-down mock-ups, showing the prepared substrate, primer, intermediate, and finish coats, as applicable, shall be used. Where the substrate is a ferrous metal, the portion remaining exposed shall be protected with a clear varnish.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Delivery, storage, and handling shall be in accordance with Section 01350.

B. Include the following information on container labels or packing slips:

1. Manufacturer’s name.
2. Name or title of material.
3. Batch numbers.
4. Stock number and date of manufacture.
5. Shelf life or expiration date.
6. Contents by volume of pigment, binder, and vehicle.
7. Thinning instructions when recommended.
8. Application instructions.
9. Color name and number.
10. Safety Data Sheets (SDS).

C. Provide controlled storage for coating materials and abrasives. Store coating materials in environmentally controlled enclosure with minimum ambient temperature of 55 degrees F. Store abrasives in dry area.

D. Maintain inventory of coating materials, solvents, and cleaners.

1.05 SCHEDULING AND SEQUENCING

A. Notify Engineer two weeks in advance of surface preparation and coating application.

B. Work systematically in accordance with submitted schedule.

C. Sequence and coordinate abrasive blasting and coating application with Work of other sections. Do not interrupt plant process or interfere with Owner's operations.

D. Coordinate coating work with installation of sealants specified in Section 07900.

E. Furnish specified testing and inspection equipment to Owner a minimum of two weeks prior to beginning surface preparation and coating work.

1.06 MANUFACTURER'S RECOMMENDATIONS

A. Apply coatings in strict compliance with manufacturer's recommendations and instructions as to environmental conditions, surface preparation, mixing, application, and curing. Where Specifications are more stringent than manufacturer's recommendations, Specifications shall prevail.

B. Resolve conflicts between Specifications and manufacturer's recommendations and instructions by obtaining written agreement between Engineer and coating manufacturer prior to beginning Work.

1.07 DESCRIPTION

A. Shop Painting - Shop painting shall be performed to the extent and as required under Section 01350 and the various individual sections of the specifications. All metal surfaces shall be given a protective shop coat of primer compatible with the field coating. Shop primer color shall be beige where available. If a prime coat has not been applied in the shop, then a prime coat shall be applied in the field after proper surface preparation and prior to the application of the finish coats.

B. Compatibility - The Contractor shall ensure the primer or finish coating applied in the shop is compatible with the specified field coatings. If the coatings are incompatible, the shop coatings shall be removed by abrasive blasting and coatings applied in conformance with this Section.

PART 2 PRODUCTS

2.01 MATERIALS

A. The products shall be as specified in the Coating Schedule. Materials selected for each coating system shall be the product of one manufacturer. The Contractor shall be

responsible for the compatibility of all components of each coating system including primer, thinner, and solvents.

2.02 COATING SCHEDULE

A. The Coating Schedule included in Part 4 of this Section identifies the areas to be painted, the required materials, and number of coats required.

PART 3 EXECUTION

3.01 ENVIRONMENTAL REQUIREMENTS

A. Environmental Conditions:

1. Perform Work of this Section under the following environmental conditions.

   a. Abrasive blast only when surface contamination can be prevented. Abrasive blast only when surface temperature is more than 5 degrees F above dew point and relative humidity is less than 85%.

   b. No coating shall be applied when the air temperature, as measured in the shade, is below 40 degrees F or above 90 degrees F. No coating shall be applied when the temperature of the surface to be painted is below 35 degrees F or as recommended by the paint manufacturer, whichever is greater. Coatings shall not be applied to wet or damp surfaces, when the relative humidity exceeds 85%, or when the surface to be painted is less than 5 degrees F above the dew point.

2. Coating work may proceed during inclement weather in environmentally controlled enclosures. Environment within enclosure shall comply with Specifications and manufacturer's recommendations. Provide adequate ventilation and illumination. Minimum illumination shall be 150-foot candles.

B. Interior Painting may be done only when the building has been thoroughly dried, by natural or artificial heat, and when the Work area is properly heated and ventilated, clean, and as nearly dust free as possible. Room temperature shall be maintained within the manufacturer's recommendations during application and until coatings are dry.

C. Dust - Coating shall not be applied in areas where dust is being generated.

3.02 PROTECTION

A. During the construction period, all electrical and mechanical equipment and other equipment and apparatus shall be protected from paint drippings by means of tarpaulins, burlap, wooden housings, or other protection.

B. Finished work of other trades, surfaces not being painted concurrently or not to be painted, and factory finished lockers, toilet partitions, etc., that will not require field painting shall be protected at all times from paint spots and damage to the finish.

C. Perform cleaning and coating operation in manner which prevents dust and contaminants from falling in newly applied coating.

D. Protect portions of Work which are partially or entirely completed and which are adjacent to surfaces being prepared by abrasive blasting.

E. Protect completed Work from solvents, contaminants, or other substances which may damage coating.

F. Prominently display “Wet Paint” signs in sufficient number to protect newly applied coating.

3.03 PREPARATION OF SURFACES

A. General - All surfaces, of whatever material, which are to be painted shall be thoroughly cleaned of dirt, grease, rust scale, or other injurious substance, and, at the time of application of the coating, shall be clean and dry.

B. Metal Surfaces:

1. Remove weld spatter and other projections. Grind sharp edges to a minimum radius of 1/8-inch. Grind rough welds smooth. Grinding shall be in accordance with SSPC Surface Preparation Commentary. Surfaces shall be smooth and contoured in compliance with SSPC-SP 12.

2. Surfaces which have not been shop coated shall be abrasive blasted prior to any prime coats. Abrasive blasting shall be done in accordance with the Coating Schedule.

3. Shop primed surfaces shall receive a field sweep blast prior to the application of subsequent coats.

4. Abrasions or defects on shop coated surfaces shall be spot primed.

5. Surfaces which are to receive a high heat coating shall be Near White Blast Cleaned (SSPC, SP-10) and painted within eight hours; or, if recommended by the manufacturer of the approved high heat coating, the surfaces may be thoroughly cleaned to bare metal and given wash coats or a cold phosphatizing treatment as recommended by the manufacturer and as approved by the Engineer.

C. Concrete and Masonry Surfaces:

1. New concrete and masonry surfaces shall be allowed to become completely cured for at least 30 days at a temperature of 75 degrees F and, immediately prior to treatment, shall be thoroughly cleaned of all dirt, grease, form release agents and stains. Curing compounds shall be removed.

2. Concrete surfaces shall be pressure washed with solution of trisodium phosphate (4 ounce per gallon) and detergent in hot water. Water temperature shall be approximately 180 degrees F. Immediately flush surface with clean potable water until pH of surface meets acceptance criteria of ASTM D4262.

3. If recommended by the coating manufacturer, on concrete surfaces less than six months old, one coat of zinc sulfate solution shall be uniformly applied and allowed to dry before application of the coating.
4. Concrete surfaces shall be abrasive blasted with coarse, hard, and angular abrasive after cleaning. Air stream shall be free of moisture and oil.
5. Acid etching is not permitted.

D. Wood Surfaces shall be sanded smooth and filled with an approved paste or liquid grain filler, and cracks and crevices shall be filled with a non-shrinking, elastic composition especially prepared for this purpose. Wood surfaces to be varnished shall be rubbed smooth with pumice and oil.

E. Clean up all debris from the surface preparation operation.

3.04 ABRASIVE BLASTING

A. Abrasives shall be expendable coal slag or aluminum oxide, free of silica, or a steel shot/grit mixture. Maintain abrasives free from dust, salts, and other impurities. Select the type and size of abrasive to yield a surface as specified in the Coatings Schedule.

B. Provide moisture and oil separators or traps of adequate size in compressed air system to provide dry and clean air supply. Drain traps automatically during blasting operation. Remove oil and moisture accumulated in air receiver by regular purging.

C. Remove weld splatter, slivers, laminations, and underlying mill scale which become visible after abrasive blasting, by grinding in accordance SSPC SP-3 and NACE RP0178. Follow grinding by final abrasive blast.

D. Surfaces which cannot be properly cleaned by abrasive blasting because of their location may be prepared by power tool cleaning in accordance with SSPC SP-11 (Power Tool Clean to Bare Metal) in lieu of abrasive blasting, subject to Engineer's approval.

E. After surface preparation but prior to priming inspect surface for corrosion. Remove corrosion products which become visible when viewed without magnification by re-blasting.

F. Remove dust and blasting residue by blowing with clean, dry air, and vacuum cleaning with clean tools.

3.05 MIXING AND THINNING

A. All mixing shall be performed by mechanical paint shakers or mixers in strict accordance with the manufacturer's printed instructions.

B. Do not use coating material which has livered, gelled, or otherwise deteriorated during storage. Thixotropic materials which obtain normal consistency when stirred are acceptable. Where a skin has formed in container, cut skin loose from sides of container and discard prior to mixing.

C. Each component of multi-component materials shall be mixed individually before use. The material shall be mixed in a manner which will insure the break-up of all lumps, complete dispersion of pigment, and a uniform composition. Materials shall be inspected after mixing for uniformity and to verify that no unmixed pigment remains at the bottom of the container.

D. The individual parts shall be mixed together in the proportions recommended by the manufacturer. The materials shall be mixed thoroughly before use and shall be agitated often enough during application to ensure a uniform composition.

E. Mixed coatings shall be strained after mixing unless the application equipment is provided with strainers. Strainers shall be of a type to remove skins and undesirable matter without removing pigment.

F. Thinner shall not be added unless required for proper application. Thinning shall be in strict accordance with the manufacturer's recommendations.

G. Mixed coatings shall have pot life stated on label and indicated in approved Shop Drawing. When pot life limit is reached, discard material, clean equipment, and mix and induct new material.

H. Store materials not in actual use in tightly covered containers. Maintain containers and equipment used in storage, mixing, and application in clean condition, free of foreign materials and residue.

3.06 COATING APPLICATION

A. Apply prime coat within eight hours of completion of surface preparation. If surface is degraded, contaminated, or wet by rain or moisture subsequent to surface preparation and prior to coating, restore surface in accordance with Specifications.

B. Prior to applying each coat, remove dust with industrial vacuum cleaner using new filters, clean tools, and clean hopper. Remove residue or foreign matter on coating before applying additional coats by pressure rinsing with 1800-2000 psi water, when required by Engineer's representative.

C. Apply coatings in accordance with applicable provisions of SSPC Paint Application Specification PA 1. Use equipment best suited for the coating material.

D. Cloudiness, spotting, laps, brush marks, roller marks, runs, sags, drips, ropiness, voids, discontinuities, pinholes, and other surface imperfections are unacceptable.

E. When spray application is approved by Engineer. Spare fittings, gun tips, gun parts, and other spray equipment shall be acceptable to Engineer.

F. Stripe coat edges, welds, corners, crevices, and other surfaces difficult to coat before applying full coat in accordance with SSPC-PA 1.

G. Coverage shall be in conformance with the manufacturer's instructions. The dry mil thickness of coatings shall be as specified in the Coating Schedule.

3.07 APPLICATION BY SPRAYING

A. Application of coatings by spraying may be permitted in locations and on surfaces approved by the Engineer. The Contractor must submit for approval a written request giving the proposed locations and the coating manufacturer's instructions for spray application. Applicator and equipment must conform to the following paragraphs:

1. Spraying shall conform to the manufacturer's recommendations.

2. Equipment:

   a. The spray equipment used shall be suitable for the intended purpose, capable of properly atomizing the coating, and equipped with suitable pressure regulators and gages. The equipment shall be in good working order.

   b. Spray equipment shall be kept sufficiently clean so that dirt, dried coating, and other foreign substances are not deposited with the coating.

   c. All solvents used in cleaning the equipment shall be completely removed before use.

   d. The equipment manufacturer's instructions for proper use shall be strictly followed.

3. Air Spray:

   a. Air caps, nozzles, and needles shall be those recommended by the manufacturers of the coating system and spray equipment being used.

   b. Moisture and oil separators or traps shall be used in the compressed air system to provide a dry and clean air supply. The traps or separators must be of adequate size and must be drained periodically during the coating application.

4. Airless Spray:

   a. Fluid tips shall be of the proper orifice size and fan angle, and the fluid control gun of proper construction, as recommended by the manufacturer of the coating system and the spray equipment being used.

3.08 CURING

A. Each coat shall be in a proper state of cure or dryness prior to the placement of the succeeding coat. Coating shall be considered sufficiently dry for recoating when an additional coat can be applied without the development of any detrimental film irregularities such as lifting, wrinkling, or loss of adhesion of the undercoat. Where an overcoat will not properly adhere to an overly cured undercoat, it shall be applied within the time period recommended by the manufacturer.

B. The curing times for the coatings shall conform to the coating manufacturer's recommendations considering ambient temperature and relative humidity.

3.09 FIELD QUALITY CONTROL

A. Thickness - The Contractor shall furnish the Engineer a suitable thickness detector of a type recommended by the coating manufacturer. Dry film measurements shall be taken in accordance with SSPC-PA 2.

B. The color of the prime coat shall be beige when available. It shall be inspected before application of intermediate or finish coats.

C. Intermediate Coats shall be the approximate shade of final coat; however, each coat shall be of a slightly different tint. Each coat shall be inspected and approved before the next coat may be applied; otherwise, credit will not be given and the Work shall be recoated.

3.10 PATCHING AND REPAIRS

A. All defective coatings shall be removed or repaired as the Engineer may direct. Surfaces with defective shop primer shall be repaired per the manufacturer's recommendations of the system in the Coating Schedule.

B. Before final approval of the Work all damaged coating surfaces (field or factory applied) shall be cleaned and repainted or touched up as directed.

3.11 CLEANING

A. Remove coating and splatter inadvertently placed on items not scheduled to be coated. Remove splatter by washing or scraping, taking care not to scratch or otherwise damage finished surfaces.

B. Remove and dispose spent abrasives, discarded coating materials, rubbish containers, rags, and other debris at the end of each work day.

3.12 MARRED EXISTING FINISHES

A. Existing buildings, pipelines, plumbing, etc., marred during construction by the Contractor shall be repainted to match the existing coating. Repainting shall be carried far enough to match the newly painted area with the existing coating.

B. Surface preparation, primer, and finish coats shall be in accordance with the Coating Schedule.

PART 4 SPECIAL PROVISIONS

4.01 RESERVED

4.02 COLORS

A. The colors used shall be selected by the Owner and the Engineer, from the manufacturer's standard colors.

B. All pipelines and associated equipment shall be color coded and banded as follows. Banding shall consist of 3-inch wide painted bands at 30-inch center to center.

Pipeline	Color of Pipe	Color of Legend
Raw Sewage	Light Gray	White
Vent Pipes	Light Gray	White

4.03 STENCILS AND LABELS

A. Lettering and flow direction arrows shall be stenciled on each pipeline describing the function of the pipeline near the equipment served, at both sides of walls and floors where pipe passes through, and at intervals of not more than 50-feet. Flow direction arrows shall be stenciled on each pipeline adjacent to valves and at each branch or tee. It is intended that all pipelines shall bear labels at the most visible point. If, in the opinion of the Engineer, the foregoing requirements will result in an excessive number of labels or arrows on a run of pipe, the number shall be reduced as directed.

B. Where the flow of a pipeline is in one direction only, an additional flow arrow shall be stenciled in front of each legend on the pipe.

C. For pipes smaller than 1-inch in outside diameter, a white plastic tag with black lettering shall be used. Secure to piping with self-locking nylon straps.

D. The legends and flow arrows shall be stenciled with approved stencil paint. Following the completion of other Work under this Item, all stencils used shall remain the property of the Owner.

E. Each chemical storage tank shall have stenciled on its side a legend describing the tank contents and the tank number as shown on the Drawings such as "Alum Tank No. 1".

F. Preprinted pressure sensitive vinyl labels may be used in lieu of stencils. Labels shall be additionally secured to the pipe at each end by 2-inch roll tape with preprinted directional arrows. Tape color shall match the label. Label size shall be determined by pipe size as recommended by the manufacturer's standard literature. Labels shall be Opti-Code as manufactured by Seton Name Plate Corporation, or equal.

4.04 RESERVED

4.05 COATING SCHEDULE

A. The following coating schedules is not guaranteed to be complete. The coating systems manufacturers are listed in no particular order, any of the four listed systems, or equal may be used.

Wastewater					
		Carboline	**Tnemec**	**AkzoNobel (International, Devoe, Glidden Professional)**	**PPG**
A.	Ferrous metals, except galvanized or stainless steel, submerged or partially submerged in wastewater or non-submerged exposed to splash or spill, including all tank mechanisms and tank mechanism support structures; clips, beams, and walkway supports; pipes, valves, sluice gates, scum baffles, and weirs:				
	Surface Preparation:	SSPC-SP 10 (NACE 2) Near White Blast Cleaning with a 1.5-2.0 mil Profile	SSPC-SP 10 (NACE 2) Near White Blast Cleaning with a 2.0 mil Profile	SSPC-SP 10 (NACE 2) Near White Blast Cleaning with a 1.5-2.0 mils Profile	SSPC-SP 10 (NACE 2) Near White Blast Cleaning with a 1.5-2.0 mils Profile
	Primer:	1 coat, Carboguard 890 (4.0-6.0 mils DFT)	1 coat, N140 Pota-Pox Plus (DFT 3.0-5.0 mils).	N/A	1 coat PPG Amerlock2/400 4.0-6.0 mils DFT
	Field Finish:	2 coats, Bitumastic 300m (8.0-16.0 DFT per coat)	2 coats, 46H-413 HB Tneme-Tar, (DFT 8.0-10.0 mils per coat).	N/A	2 coats PPG Amercoat 78HB applied to a DFT 8.0-10.0 mils DFT per coat

END OF SECTION

SECTION 11050
COMMON EQUIPMENT REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

A. The Section includes the general requirements for all equipment installed under this Contract.

B. Equipment items shall meet the requirements specified herein, plus the specific requirements noted in the technical sections.

C. The specific requirements included under a particular section shall take precedence.

D. Additional product requirements are specified in Section 01350.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. Specific equipment submittals are specified in the related sections.

b. Equipment shop drawings shall include outline and dimension drawings of the actual equipment being furnished.

c. With the shop drawings, the complete motor nameplate data shall be furnished as well as all information requested below which may not be on the motor nameplate:

1) Manufacturer.

2) Rated Horsepower.

3) Operating Speed Range*.

4) Operating Voltage(s).

5) Current Draws at Operating Voltage(s)*.

6) Operating Frequency (Hz).

7) Service Factor.

8) Type Enclosure.

9) Frame Size.

10) NEMA Design Designation.

11) Locked Rotor Code Letter.

12) Duty Rating.

13) Minimum Full Load Efficiency.

14) Nominal Efficiency*.

15) Power Factor*.

16) Maximum Size Capacitor Permitted to be Connected to Motor.

17) Insulation Class.

18) Location of motor terminal housing (F1 or F2).

19) Motor no load sound pressure level of dB(A) weighted at 3 feet from motor.

20) Motor Full Load Sound Pressure Level of dB(A) - weighted at 3 feet from motor.

21) Bearing Ratings.

22) Full Load Torque.

23) Break Down Torque.

24) Locked Rotor Torque.

* Provide data at following loads: Service factor (if greater than 1.0) times full load (i.e., 1.15 x full load), 100%, 75%, 50%, 25%, and no load.

d. Minimum full load efficiency shall be tested in accordance with IEEE Standards 112 Test Method B as described in Section 6.4 of IEEE Standard 112. Polyphase motors larger than 125 horsepower shall be listed in accordance with IEEE Standard 112 with stray-load loss determined by direct or indirect measurements.

2. Information for the Record:

a. Operation and maintenance manual.

1.03 QUALITY ASSURANCE

A. Manufacturer's name, make, model number and other designations provided in the contract documents are to establish the significant characteristics, including but not limited to, type, function, dimensions and physical properties, performance, and appearance for the purpose of evaluating comparable products. Contractor shall verify product, equipment or system proposed meets or exceeds the requirements as specified or shown on the drawings.

1.04 ELECTRICAL AND CONTROL COORDINATION

A. If the current requirement of any motor or piece of equipment is increased to such an extent that the wiring, conduit, and/or starter for that motor or equipment must be

increased from that shown on the Electrical Drawings, the Contractor shall furnish and install the larger items. The increased wiring, conduit, and/or starter cost shall be included under the Contract and no additional compensation will be allowed.

B. All electrical, instrumentation, and control equipment and panels furnished under this Contract shall conform to appropriate Sections of Division 16 of these Specifications. Equipment and panels shall be NEMA 4X, unless otherwise shown on the Drawings or Specifications.

C. Certain equipment items shall be connected to the plant control system as shown on the Control (P&ID) Drawings. Those connections and any remote control connections shall be wired to clearly labeled terminal strips within the equipment control panel.

D. Analog signals for input to a programmable controller system or other device shall be 4-20 mADC and where required, current to current transducers or other device shall be furnished to produce an isolated signal to the programmable controller analog input module.

E. Digital input signal sources shall provide an isolated contact rated at 5-amp minimum, 115 VAC for AC programmable controller inputs or devices and 1 amp minimum 28 VDC for DC rated inputs or devices.

1.05 PRODUCT HANDLING

A. Unless otherwise specified in the individual sections, the Contractor shall deliver, handle, store, and maintain materials and equipment in accordance with the requirements of the manufacturer.

B. Materials, equipment, and articles to be incorporated into the Work shall be stored so as to facilitate inspection and inventory and in such manner as to ensure the preservation of their quality and fitness for the Work. Stocked materials shall be subject to test and shall meet the requirements of the Specifications at the time of substantial completion of the Work.

C. Where construction is in roads or streets, that portion of the right-of-way not required for public travel may be used for temporary storage purposes unless otherwise prohibited. Materials shall not be stored in areas where such storage creates a hazard. Any other additional space required for construction or storage of materials and equipment shall be obtained by the Contractor at his expense.

D. The Contractor shall confine his equipment, the storage of materials and equipment, and the operations of his workers to areas permitted by law, ordinances, permits, and the requirements of the Contract Documents, and shall not unreasonably encumber the premises with materials or equipment.

E. Switchgear, motor control centers, panelboards, instrument control panels, fixtures, and like equipment shall be received and stored in a dry, clean, dust-free, heated area. If no such area is available at the time such equipment is received, such space shall be provided by the Contractor at no expense to the Owner. If equipment is stored in an area conducive to the formation of condensation, heaters shall be provided to prevent

condensation. Once the equipment is installed in its final position, suitable protection shall be provided to prevent damage by falling material, dust, paint, dirt, and moisture.

PART 2 PRODUCTS

2.01 GENERAL

A. AC motor(s) shall conform to the latest applicable NEMA, IEEE, and ANSI standards.

B. Motor installation shall not exceed 88 dB(A) weighted maximum level at 3 feet from the motor throughout the entire speed range and load range.

C. Motor bearings shall be antifriction type, grease lubricated with a minimum L-10 rating of 17,500 hours for belted duty and 100,000 hours for direct coupled duty.

1. Thrust bearings in vertical motors shall be adequate for the loading encountered.

2. Belt-driven power systems with jackshafts, and couplings, to isolate the belt loadings from the motor bearings shall be regarded as direct coupled duty.

D. Motor conduit boxes shall be sized with capacity to meet the requirements of the National Electrical Code. Motors shall be furnished in an “F1” terminal housing assembly (facing connection box, motor shaft extension is to the right) unless otherwise shown on Drawings or specified.

E. Motor frames shall be cast iron construction with corrosion resistant hardware.

F. Each motor shall be continuous duty rated NEMA Design B with normal starting torque, unless otherwise shown or specified.

G. Output torque and speed characteristics of each motor shall be suitable to operate the connected load over the full range of operating speeds and load conditions without exceeding the nameplate current rating or temperature rise on a continuous duty basis.

H. Insulation shall be Class F or Class H.

I. Each polyphase squirrel-cage induction motor shall meet or exceed minimum and nominal efficiencies listed in NEMA MG-1, Table 12-10.

2.02 AC MOTORS UNDER 1 HP

A. Unless otherwise shown or specified, each fractional motor under 1/2 hp shall be designed for single phase, 115 and 230 volt, 60 Hz service.

B. Unless otherwise shown or specified, each fractional motor 1/2 through 3/4 hp shall be designed for 3 phase, 208, 230, and 460 volt, 60 Hz service.

2.03 INTEGRAL AC MOTORS

A. AC motor(s) 1 hp and larger shall have a 1.15 service factor at a 40 degrees C ambient temperature. Motor shall be capable of operating at the 1.15 service factor rating on a continuous basis per NEMA MG1-12.42 Item 1b.

B. Motor enclosure types shall be as specified in the equipment specifications and shall be of one of the following designations.

1. Open drip-proof protected (ODP).
2. Totally enclosed non-ventilated (TENV), or totally enclosed fan cooled (TEFC).
3. Explosion proof Class 1, Division 1, Group D.
4. Submersible water cooled.

C. Multi-speed motors shall have the energy efficient design designated for the high-speed winding operation.

2.04 SPECIAL APPLICATION MOTOR(S)

A. Special application motor(s) are defined as those used on such devices as appliances, tools, unit heaters, door operators, refrigeration units and sump pumps.

B. Manufacturer's standard motor may be approved by the Engineer where a redesign of the unit would be required to furnish energy efficient motors.

2.05 RESERVED

2.06 RESERVED

2.07 RESERVED

2.08 EXPLOSION PROOF MOTORS

A. AC motors for use in a Class I, Division 1, Group D location shall meet the requirements of paragraph 2.01 above.

B. Explosion proof motors 3 hp and larger shall have a 1.15 service factor. Such motors shall be capable of operating at the 1.15 service factor rating on a continuous basis per NEMA MG1-12.42 Item 1b.

C. Each motor shall be furnished with internal thermal protectors with normally closed contacts that will open should the safe operating motor temperature be exceeded per UL requirements. These contacts shall be placed in series with each other and with the coil of the magnetic motor starter, and/or the VFD enable circuit if used with a VFD, on all applications.

2.09 RESERVED

2.10 RESERVED

2.11 RESERVED

2.12 SAFETY GUARDS

A. Installed equipment shall be equipped with all guards, shields, and devices to meet OSHA requirements.

B. Chain and belt guards shall be totally enclosed steel construction, 14-gauge minimum for guards up to 60-inch center distance and 12-gauge minimum for larger guards.

C. Guards shall include expanded metal inspection panels. Removable access panels shall be provided to perform routine maintenance.

2.13 MANUFACTURER'S NAMEPLATE

A. Equipment shall be identified by permanently attached nameplate of corrosion-resistant metal. Plates shall bear the following information:

1. Manufacturer's name.
2. Serial and model numbers.
3. Rated capacity.
4. Temperature, pressure, or other limitations.

2.14 ANCHOR BOLTS

A. Equipment anchor bolts shall be as specified in Section 05500.

PART 3 EXECUTION

3.01 INSTALLATION

A. Equipment shall be installed in accordance with the manufacturer's instructions and Contract Documents. Required anchors, grout, and leveling shims shall be provided by the Contractor.

B. Alignment procedures and acceptable runout tolerances on couplings shall be submitted.

3.02 ROTATING EQUIPMENT ALIGNMENT

A. To aid in the field alignment of all equipment base plate mounted rotating equipment, push bolts (jacking bolts) shall be furnished and welded to the base plate.

B. All rotating equipment shall be field checked for alignment after installation and initial operation. The equipment shall be at operating temperature. The minimum method of indicating alignment will be the “16-point” method. Other proposed methods must be submitted for approval to the Engineer.

C. The alignment results are to be submitted for record. They are to include the final set of indicator readings and a plan view sketch of the motor and driven machine base, and the thickness of shims for each shimmed anchor bolt. The thickness of shims shall not exceed 0.25 inches.

3.03 INITIAL LUBRICATION

A. Initial lubrication required for start-up, field test operation, and normal operation prior to substantial completion shall be furnished and applied in accordance with the manufacturer’s recommendations.

B. Where lubricating points are not easily accessible, provide extensions as required for easy access with normal grease gun.

3.04 PACKING

A. Each shaft containing a packing gland shall be checked for condition by backing the packing gland off and examining for proper grade, amount, and type of packing as recommended by the manufacturer.

3.05 MAINTENANCE

A. The Contractor shall perform and log all preventive maintenance tasks as recommended by the manufacturer while the equipment is in storage and after installation until the equipment has been accepted by the Owner.

3.06 TROUBLESHOOTING

A. Should a problem occur before acceptance, the Contractor shall determine the cause and recommend corrective actions to the Engineer. The Contractor shall correct equipment and installation deficiencies.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

SECTION 11735
PUMPING EQUIPMENT

PART 1 GENERAL

1.01 SCOPE

A. This Section includes the furnishing and installing of pumping equipment as shown on the Drawings, as scheduled in Part 4, and as specified herein.

B. The pumping equipment shall be furnished with all drives, drive shafts, couplings, steady bearings, belts, drive shaft and belt guards, drive bases, pump bases, anchor bolts, anchor bolt sleeves, and other appurtenances as specified or required for a complete installation and satisfactory operation.

C. All Work performed under this Section shall be in accordance with all approved trade practices and manufacturers' recommendations.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

   a. Manufacturer's warranty.

   b. Manufacturer certification/affidavit.

   c. Manufacturer's literature.

   d. Manufacturer's certified test curves (computer model printouts are not acceptable).

   e. Manufacturer's certification of factory performed impeller dynamically balancing.

   f. Information and data concerning the materials of construction, salient components and details of construction of equipment and components.

   g. Motor data in accordance with Section 11050.

2. Information for the record.

   a. Manufacturer's installation instructions.

   b. Operation and maintenance manuals.

   c. Manufacturer's certification of installation.

1.03 QUALITY ASSURANCE

A. Manufacturer Warranty and Service Packages:

1. Warranty Submittals - At the time of shop drawing submittal, the Contractor shall submit a written warranty from the manufacturer(s) covering workmanship and materials on those pumps with drive motors of 7-1/2 hp or larger when used as intended for this installation. Warranty period shall be one-year, unless specified otherwise. The warranty period shall commence on the date of Substantial Completion. Under terms of this warranty, the manufacturer shall furnish and install all replacement parts for any defective component at no cost to the Owner. The provisions of this warranty shall not be construed as relieving or reducing the obligations of the Contractor outlined in the General Conditions of these Specifications.
2. Owner shall have the option to purchase additional manufacturer warranty options and service package plans, for a cost. Contractor shall provide, upon request, the warranty and service plan information and their respective cost.
3. Warranty options should include, but not be limited to:
   a. Prorated warranties, terms and conditions, and length of time.
   b. A full replacement (non-prorated) warranty, terms and conditions, for time frames up to 5 years.
   c. Service package plans.

B. Manufacturer Certification/Affidavit:
1. Manufacturer shall provide affidavit certifying that:
   a. Manufacturer has examined the Contract Documents, including but not limited to the Drawings and specifications.
   b. Understand the installation and parameters specified herein and shown on the Drawings.
   c. The equipment specified is suitable for this application.
   d. Notified Owner and Engineer of any modifications required to the system or the equipment in this application.

PART 2 PRODUCTS

2.01 PUMPS

A. General:
1. Each pump shall be designed and furnished to meet the operating conditions specified in Part 4 of this Section. The type of pump for each service is given in the Schedule in Part 4.
2. Each pump shall be of the manufacturer and model listed in Part 4 or equal. All pumps used for one type of service shall be of the same manufacturer.
3. Each pump shall be shop tested in accordance with standards of the Hydraulic Institute. Certified test curves indicating capacity, head, efficiency, brake

horsepower, and speed shall be submitted to the Engineer for approval. No pump shall be shipped to the job site until the test curves have been approved by the Engineer.

4. No point on the centrifugal pump performance curve shall require more than the nameplate horsepower of the drive motor.

B. Submersible Pump:

1. Submersible centrifugal pumps shall be in accordance with the requirements described in the following paragraphs and in Part 4 of this Section.

2. The motor shall be explosion proof and conform with Section 11050. The motors shall be 1.15 SF, explosion proof (CLas 1, Group C & D) submersible with tandem mechanical seals, moisture sensors, internal thermostats, with adequate power cable length design for 15 minute air duty manufactured by Baldor and supplied by the pump manufacturer.

3. The pump shall be easily removed from its chamber to ground level for inspection or service without requiring dewatering of the chamber. This shall be accomplished by utilizing a sliding guide bracket attached to the pump, two guide bars adequately braced, a lifting chain reaching ground level, and a specially formed discharge flange that will automatically and firmly connect and disconnect with the discharge pipe without bolts, nuts, fasteners, or extreme force.

4. A wearing ring system shall be installed to provide efficient sealing between the volute and impeller. The wear ring shall consist of a stationary ring made of nitrite rubber molded with a steel ring insert which is drive fitted to the volute inlet and a rotating 304 stainless steel ring which is drive fitted to the impeller eye.

5. Each pump shall be provided with a cartridge type CS faced mechanical seals provided by the pump manufacturer.

6. Thermal sensors shall be used to monitor stator temperatures. The stator shall be equipped with three thermal switches, embedded in the end coils of the stator winding (one switch in each stator phase). These shall be used in conjunction with and supplemental to external motor overload protection and wired to the control panel.

7. The pump casing shall be constructed of ductile iron with Class 125 discharge flanges.

8. The pumps shall be provided with an oil level monitoring system installed in a NEMA 3R minimum cabinet complete with PVC plastic reservoir and adequate length of oil tubing to reach the pumping units. The manufacturer's standard electrical relays and equipment is not required.

9. The pump shaft shall be heat treated steel.

10. The pump shall be provided with chopping capabilities achieved with a cast steel, heat treated to minimum 60 Rockwell Hardness impeller and cutting bar. The impeller shall be dynamically balanced at the factory before shipping.

11. The pumping units shall be treated with a solvent wash and a single coat of Tnemec Perma-Shield PL Series 431 Epoxy (minimum MDFT).

12. Stainless steel nameplates shall be attached to the pump and drive motor giving the manufacturer's model and serial number, rated capacity, head, speed, and all pertinent data.

13. The pumping units shall be furnished complete with required accessories; sliding brackets, guide bars, cadmium plated pull chain, aluminum access doors, power cables, permanently installed discharge connection elbows, and all other necessary appurtenances.

    a. Sliding bracket shall be integral with the pump and shall be of cast iron.

    b. Two guide rails (2-inch Schedule 40) shall be provided with each installation for guiding the pump unit to and from its operational position. The rails shall be of stainless-steel pipe of the size recommended by the manufacturer. Bars at no time shall carry any of the pumps' weight. Bracing for guide bars shall be spaced at a maximum distance as shown on the plans.

    c. Cadmium plated pull chain shall be of adequate length, lifting capacity and size to lift pump to ground level from operating position.

    d. Power cable and control cables shall be jacketed in Hypalon or approved equal.

    e. The discharge elbow shall be of cast iron and shall support the pump when the pump is in its operational position.

    f. Guide rail stiffener brackets shall be 316 stainless steel.

    g. The top mount bracket and chain holding bracket shall be 316 stainless steel.

    h. The Contractor may wish to reference the Engineer's Quote number #41329A obtained from Vaughan Pump's representative, JGM Valve, 1155 Welch Road, Commerce, Michigan, 48390.

    i. **The Contractor should be aware that the pump manufacturer may not include all of the required accessories as part of a standard bill of materials and will be required to provide those items not supplied by the pump manufacturer.**

14. Spare Parts:

    a. One impeller

    b. One set of cutters

c. One mechanical seal.

2.02 RESERVED

2.03 RESERVED

2.04 ACCESSORIES

A. Each pump shall be provided with easily identifiable terminal points to facilitate the exchange of the central control functions between the pumps and the process control system as indicated on the Contract Drawings.

B. Pressure Gauges and Connections:

1. See Section 15400.

2. Submersible pumps shall be supplied with a discharge gauge only. Gauge shall be located in the discharge piping at a location easy to access.

C. Each set of pumps shall be provided with one set of any special tools required for complete service and maintenance.

2.05 RESERVED

2.06 RESERVED

2.07 CONTROL PANELS

A. The Franklin Street Pump Station shall be supplied with a control (starter) panel supplied by Vaughn Pumps and manufactured by Commerce Controls, Inc., 41069 Vincenti Court, Novi, Michigan. The Control Panel was developed by Vaughn and Supplied to the Engineer under Proposal #19-536.

B. The Control Panel will include the following components.

1. 480V, 3 Phase NEMA 4X SST Control Panel with Inner Door

2. 200A Main Disconnect

3. Two 90 A Circuit Breakers Pump Disconnects

4. Two NEMA Rated Size 3 Motor Starters

5. 480 V Phase Monitor

6. Control Power Transformer

7. 120V Branch Circuits (3 Minimum)

8. Control Relays

9. Pilot Lights

10. HOA Selector Switch
11. Enclosure Heater
12. GFI Receptacles (2 minimum)
13. Enclosure Light
14. Alarm Beacon

C. The pump manufacturer will supply all design, equipment, instrumentation, control panel construction, programming, startup and training.

D. Installation of the panel on the equipment rack and required hardware will be by the Contractor.

E. Installation and wiring outside of the panel will be performed by the Contractor.

PART 3 EXECUTION

3.01 ERECTION

A. The equipment shall be erected in accordance with the manufacturer's recommendations. Required grout, equipment bases and leveling shims shall be provided by the Contractor.

3.02 INITIAL LUBRICATION

A. Initial lubrication required for start-up and field test operation shall be furnished and applied in accordance with the manufacturer's recommendations.

3.03 INSPECTION, START-UP, AND TESTING

A. The Contractor shall furnish a qualified representative of the manufacturer to perform inspection, start-up, and training services. The manufacturer's representative shall be experienced in the installation, start-up, operation, and maintenance of the equipment.

B. The representative shall check the installation and supervise final adjustments and initial start-up of the equipment. The representative shall certify that the installation is correct and that the equipment is operating satisfactorily.

C. Within two weeks of start-up, the manufacturer shall submit to the Engineer a written report (minimum 4 copies) covering the representative's inspection and start-up of the equipment. This report shall include the manufacturer's certification that the installation is correct and that the equipment is operating satisfactorily.

D. After the installation and operation of the equipment has been certified, the manufacturer's representative shall train the Owner's personnel for one, eight-hour day in the proper operation and maintenance of the equipment. The Owner may videotape the training.

PART 4 SPECIAL PROVISIONS

4.01 PUMP SCHEDULE

A. The following tables provide the operating conditions, type of pump, manufacturer name and model number, along with salient features specific to each manufacturer. The pumps listed are selected for the specified service and acceptable to the owner.

B. Other pump manufacturers are not being considered.

Description	Franklin Street PS	Industrial Drive PS
Quantity	2	See Specification Section 11736.
Type	Submersible	
Model No.	Vaughan S4S-113	
Solids Diameter Passing	3”	
Stator or Impeller Type	Enclosed	
Impeller Trim	10.60”	
Seal Type	Mechanical	
Lubrication	None	
Motor HP	30HP	
Pump RPM	1750RPM	
Voltage	460	
Phase	3	
Minimum Pump Efficiency (at design point)	67%	
Design Point (gpm/ft TDH)	950gpm/73ft	
Certified Test Curve (Yes/No)	Yes	

END OF SECTION

SECTION 11736
FACTORY BUILT ABOVE GROUND PUMP STATION WITH DUPLEX SELF-PRIMING PUMPS

PART 1 GENERAL

1.01 SCOPE

A. Work under this section includes but is not limited to furnishing and installing a factory built duplex pump station as indicated on the project drawings, herein specified, as necessary for proper and complete performance.

B. Publications listed below form part of this specification to extent referenced in the text by basic designation only. Consult latest edition of publication unless otherwise noted.

1. American National Std. Institute (ANSI) / American Water Works Assoc. (AWWA)

a.	ANSI B16.1	Cast iron pipe flanges and flanged fittings.
b.	ANSI/AWWA C115/A21.51	Cast/ductile iron pipe with threaded flanges.
c.	ANSI 253.1	Safety Color Code for Marking Physical Hazards.
d.	ANSI B40.1	Gages, Pressure and Vacuum.
e.	AWWA C508	Single Swing Check Valves

C. American Society for Testing and Materials (ASTM)

1.	ASTM A48	Gray Iron Castings.
2.	ASTM A126	Valves, Flanges, and Pipe Fittings.
3.	ASTM A307	Carbon Steel Bolts and Studs.
4.	ASTM A36	Structural Steel.

D. Institute of Electrical and Electronics Engineers (IEEE)

1.	IEEE Std 100	Standard Dictionary of Electrical Terms.
2.	IEEE Std 112	Test Procedure for Polyphase Induction Motors.
3.	IEEE Std 242	Protection of Industrial and Control Power Systems.

E. National Electric Code (NEC) / National Electrical Manufacturers' Assoc. (NEMA)

1.	NEC	National Electrical Code.
2.	IEEE NEMA Std MG1	Motors and Generators.

1.02 SYSTEM DESCRIPTION

A. Design requirements consist of factory-built pump station design, including materials of construction, pump features, valves and piping, and motor controls shall be in accordance with requirements listed under PART 2 - PRODUCTS of this section.

1. Contractor shall furnish and install one factory built above ground, automatic pump station. The station shall be complete with all equipment specified herein; factory assembled in a fiberglass reinforced polyester resin enclosure.

2. In addition to the station enclosure, principle items of equipment shall include two horizontal, self-priming, centrifugal sewage pumps, V-belt drives, motors, internal piping, valves, motor control panel, automatic liquid level control system, and internal wiring.

B. Performance Criteria

1. Pumps must be designed to handle raw, unscreened, domestic sanitary sewage. Pumps shall have 4" suction connection, and 4" discharge connection. Each pump shall be selected to perform under following operating conditions:

a.	Capacity (GPM)	400
b.	Total Dynamic Head (feet)	18
c.	Total Dynamic Suction Lift (feet)	15.1
d.	Maximum Repriming Lift (feet)	13.2
e.	Maximum Static Suction Lift (feet)	17.2

C. Utility Power Requirements

1. Site power furnished to pump station shall be three phase, 60 hertz, 460 volts, 3 wire, maintained within industry standards. The available fault current provided at the pump station control panel is 10,000 kA rms symmetrical. Voltage tolerance shall be plus or minus 10 percent. Phase-to-phase unbalance shall not exceed 1% average voltage as set forth in NEMA Standard MG-1. Control voltage shall not exceed 132 volts.

1.03 SUBMITTALS

A. Product Data

1. Prior to fabrication, the pump station manufacturer shall provide submittal data for review and approval.

2. Submittal shall include shop drawings, electrical ladder logic drawings, and support data as follows:

a. Catalog cuts sheets reflecting characteristics for major items of equipment, materials of construction, major dimensions,

b. Motor and v-belt drive data,

c. Pump characteristic curves showing the design duty point capacity (GPM), head (FT), net positive suction head required (NPSHr), and hydraulic brake horsepower (BHP).

d. Electrical components used in the motor branch and liquid level control shall be fully described.

B. Shop Drawings

1. Shop drawings shall provide layout of mechanical equipment and anchor bolt locations for station. Pipe penetrations and station access clearances shall be dimensioned relative to the station centerline. The electrical ladder logic drawings shall illustrate motor branch and liquid level control circuits to extent necessary to validate function and integration of circuits to form a complete working system.

C. Operations and Maintenance Manuals

1. Operation shall be in accordance with written instructions provided by the pump station manufacturer. Comprehensive instructions supplied at time of shipment shall enable personnel to properly operate and maintain all equipment supplied. Content and instructions shall assume operating personnel are familiar with pumps, motors, piping and valves, but lack experience on exact equipment supplied.

2. Documentation shall be specific to the pump station supplied and collated in functional sections. Each section shall combine to form a complete system manual covering all aspects of equipment supplied by the station manufacturer. Support data for any equipment supplied by others, even if mounted or included in overall station design, shall be provided by those supplying the equipment. Instructions shall include the following as a minimum:

a. Functional description of each major component, complete with operating instructions.

b. Instructions for operating pumps and pump controls in all modes of operation.

c. Calibration and adjustment of equipment for initial start-up, replacement of level control components, or as required for routine maintenance.

d. Support data for commercially available components not produced by the station manufacturer, but supplied in accordance with the specifications, shall be supported by literature from the prime manufacturer and incorporated as appendices.

e. Electrical schematic diagram of the pump station circuits shall be in accordance with NFPA 70. Schematics shall illustrate, to the extent of authorized repair, pump motor branch, control and alarm system circuits including interconnections. Wire numbers and legend symbols shall be shown. Schematic diagrams for individual components, not

normally repairable by the station operator, need not be included. Details for such parts shall not be substituted for an overall system schematic. Partial schematics, block diagrams, and simplified schematics shall not be provided in lieu of an overall system diagram.

f. Mechanical layout drawing of the pump station and components, prepared in accordance with good commercial practice, shall provide installation dimensions and location of all pumps, motors, valves and piping.

3. Operation and maintenance instructions which rely on vendor cut-sheets and literature which include general configurations or require operating personnel to selectively read portions of the manual shall not be acceptable. Operation and maintenance instructions must be specific to equipment supplied in accordance with these specifications.

1.04 QUALITY ASSURANCE

A. Manufacturer's Qualifications

1. The pumps and pump station manufacturer must be ISO 9001:2008 revision certified, with scope of registration including design control and service after sales activities.

2. The pumps and pump station manufacturer must be registered to the ISO 14001 Environmental Management System standard and as such is committed to minimizing the impact of its activities on the environment and promoting environmental sustainability by the use of best management practices, technological advances, promoting environmental awareness and continual improvement.

3. Upon request from the engineer, the pump station manufacturer shall prove financial stability and ability to produce the station within the specified delivery schedules. Evidence of facilities, equipment and expertise shall demonstrate the manufacturer's commitment to long term customer service and product support.

4. The term "pump manufacturer" or "pump station manufacturer" shall be defined as the entity which designs, machines, assembles, hydraulically tests and warranties the final product. Any entity that does not meet this definition will not be considered a "pump manufacturer" or "pump station manufacturer" and is not an acceptable supplier. For quality control reasons and future pump and parts availability, all major castings of the pump shall be sourced and machined in North America.

B. Pump Performance Certifications

1. Solids Handling Capability

a. All internal passages, impeller vanes, and recirculation ports shall pass a 3" spherical solid. Smaller internal passages that create a maintenance

nuisance or interfere with priming and pump performance shall not be permitted. Upon request from the engineer, manufacturer's certified drawings showing size and location of the recirculation port(s) shall be submitted for approval.

2. Reprime Performance

a. Consideration shall be given to the sanitary sewage service anticipated, in which debris is expected to lodge between the suction check valve and its seat, resulting in the loss of the pump suction leg, and siphoning of liquid from the pump casing to the approximate center line of the impeller. Such occurrence shall be considered normal, and the pump must be capable of automatic, unattended operation with an air release line installed.

b. During unattended operation, the pump shall retain adequate liquid in the casing to insure automatic repriming while operating at its rated speed in a completely open system. The need for a suction check valve or external priming device shall not be required.

c. Pump must reprime 13.2 vertical feet at the specified speed and impeller diameter. Reprime lift is defined as the static height of the pump suction above the liquid, while operating with only one-half of the liquid remaining in the pump casing. The pump must reprime and deliver full capacity within five minutes after the pump is energized in the reprime condition. Reprime performance must be confirmed with the following test set-up:

1) A check valve to be installed downstream from the pump discharge flange. The check valve size shall be equal (or greater than) the pump discharge diameter.

2) A length of air release pipe shall be installed between pump and the discharge check valve. This line shall be open to atmosphere at all times duplicating the air displacement rate anticipated at a typical pump station fitted with an air release valve.

3) The pump suction check valve shall be removed. No restrictions in the pump or suction piping will prevent the siphon drop of the suction leg. Suction pipe configuration for reprime test shall incorporate a 2 feet minimum horizontal run, a $90^{-degree}$ elbow and vertical run at the specified lift. Pipe size shall be equal to the pump suction diameter.

4) Impeller clearances shall be set as recommended in the pump service manual.

5) Repeatability of performance shall be demonstrated by testing five consecutive reprime cycles. Full pump capacity (flow) shall be achieved within five minutes during each cycle.

6) Liquid to be used for reprime test shall be water.

7) Utilize 6” suction piping for reprime test.

3. Upon request from the engineer, certified reprime performance test results, prepared by the manufacturer, and certified by a registered professional engineer, shall be prepared and forwarded to the customer.

C. Factory System Test

1. All internal components including the pumps, motors, valves, piping and controls will be tested as a complete working system at the manufacturer's facility. Tests shall be conducted in accordance with Hydraulic Institute Standards at the specified head, capacity, rated speed and horsepower. Factory operational test shall simulate actual performance anticipated for the complete station.

2. Upon request from the engineer, the operational test may be witnessed by the engineer, and/or representatives of his choice, at the manufacturer's facility.

D. Manufacturer’s Start-up Services

1. The manufacturer's technical representative shall inspect the completed installation, correct or supervise the correction of any defect or malfunction, and instruct operating personnel in the proper operation and maintenance of the equipment as described in Part 3 of this Section.

1.05 MANUFACTURER’S WARRANTY

A. The pump station manufacturer shall warrant all equipment to be of quality construction, free of defects in material and workmanship. A written warranty shall include specific details described below.

1. In addition to defects in material and workmanship, fiberglass reinforced polyester station enclosures are warranted for sixty (60) months to be resistant to rust, corrosion, corrosive soils, effects of airborne contamination or physical failures occurring in normal service for the period of the pump station warranty.

2. All other equipment, apparatus, and parts furnished shall be warranted for sixty (60) months, excepting only those items that are normally consumed in service, such as light bulbs, oils, grease, packing, gaskets, O-rings, etc. The pump station manufacturer shall be solely responsible for warranty of the station and all components.

B. Components failing to perform as specified by the engineer, or as represented by the manufacturer, or as proven defective in service during the warranty period, shall be replaced, repaired, or satisfactorily modified by the manufacturer.

PART 2 – PRODUCT

2.01 UNITARY RESPONSIBILITY

A. In order to unify responsibility for proper operation of the complete pumping station, it is the intent of these Specifications that all system components be furnished by a single supplier (unitary source). The pumping station must be of standard catalog design, totally warranted by the manufacturer. Under no circumstances will a system consisting of parts compiled and assembled by a manufacturer's representative or distributor be accepted.

2.02 MANUFACTURER

A. The specifications and project drawings depict equipment and materials manufactured by The Gorman-Rupp Company which are deemed most suitable for the service anticipated. No other alternate manufacturers will be considered acceptable to ensure conformity with equipment currently in use in the Owner's wastewater collection system.

2.03 STATION ENCLOSURE

A. The station enclosure shall contain and protect all pumps, interior piping, valves and associated controls. Enclosure shall incorporate the following design and service features:

1. Access panels must be supplied on all sides. Location and size shall permit access for routine maintenance functions such as pump and motor inspection, drive belt adjustment, and pump clean-out. Non-hinged panels shall be secured with stainless steel tamper-proof hardware.
2. A continuous hinge and latch shall be installed on at least two access panels. The hinged panels shall allow easy access to the electrical controls for frequent adjustments and inspections. A two-point mechanical latch assembly shall secure the panel at top and bottom. Latch handle locks shall be match keyed, requiring only one key to open all access panels.
3. A vent in one access panel shall allow free air flow for enclosure ventilation.
4. The complete station enclosure, less base, must be completely removable after disengaging reusable hardware. After disassembly, no portion of the enclosure (except electrical service entrance) shall project above the base surface to interfere with maintenance or endanger personnel.
5. Disassembly and removal of the enclosure shall require no more than two people working without assistance of lifting equipment.

B. Station enclosure shall be manufactured of molded reinforced orthophthalic polyester resins with a minimum of 30% fiberglass, and a maximum of 70% resin. Resin fillers or extenders shall not be used.

1. Chopped glass fibers of 1-1/4-inch average length shall be sprayed and rolled. Major design consideration shall be given to structural stability, corrosion resistance, and watertight integrity. The polyester laminates shall provide a balance of mechanical, chemical, and electrical properties to insure long life. They must be impervious to micro-organisms, mildew, mold, fungus, corrosive liquids, and gases which are expected to be present in the environment surrounding the wet well.
2. All interior surfaces of the housing shall be coated with a polyester resin-rich finish providing maintenance-free service, abrasion resistance, and protection from sewage, greases, oils, gasoline, and other common chemicals.
3. Outside surfaces of the enclosure shall be coated with gel-coat pigmented resin to insure long maintenance-free life and UV protection. Color used shall de-emphasize the presence of dirt, grease, etc.
4. Samples of available colors shall be submitted for review and selection by the Owner.

C. Station base shall be constructed of pre-cast, reinforced concrete encapsulated in a fiberglass mold. The design shall resist deformation of the structure during shipping, lifting, or handling. Base shall incorporate drainage provisions, and an opening sized to permit installation of piping and service connections to the wet well. After installation, the opening shall serve as a grout dam to be utilized by the contractor. The base shall incorporate anchor bolt recesses for securing the complete station to a concrete pad (supplied by the contractor) in accordance with the project plans.

D. A blower mounted in the station roof shall be sized to exchange station air volume at least once every two minutes. Blower motor shall energize automatically at approximately 70 degrees F, and turn off at 55 degrees F. The blower motor control circuit shall incorporate a thermal-magnetic circuit breaker providing overcurrent and overload protection. Exhaust and inlet locations shall prevent the entrance of rain, snow, or debris.

E. Station Heater

1. Pump station shall be provided with a 1300/1500-watt, 115-volt electric heater with cord and grounding plug. Ungrounded heaters shall not be acceptable.

F. Insulation Package

1. The pump station shall be furnished with 1" thick spray foam insulation, which shall be applied to the roof, doors, and corner panels.

2.04 PUMP DESIGN

A. Pumps shall be horizontal, self-priming centrifugal type, designed specifically for handling raw, unscreened, domestic sanitary sewage. Pump solids handling capability and performance criteria shall be in accordance with requirements listed under PART 1 - GENERAL of this section.

B. The pump manufacturer must be ISO 9001:2000 revision certified, with scope of registration including design control and service after sales activities.

C. Materials and Construction Features

1. Pump casing: Casing shall be cast iron Class 30 with integral volute scroll. Casing shall incorporate following features:

   a. Mounting feet sized to prevent tipping or binding when pump is completely disassembled for maintenance.

   b. Fill port cover plate, 3 1/2" diameter, shall be opened after loosening a hand nut/clamp bar assembly. In consideration for safety, hand nut threads must provide slow release of pressure, and the clamp bar shall be retained by detente lugs. A Teflon gasket shall prevent adhesion of the fill port cover to the casing.

   c. Casing drain plug shall be at least 1 1/4" NPT to insure complete and rapid draining.

   d. Liquid volume and recirculation port design shall be consistent with performance criteria listed under PART 1 - GENERAL of this section.

2. Cover plate: Cover plate shall be cast iron Class 30. Design must incorporate following maintenance features:

   a. Retained by hand nuts for complete access to pump interior. Cover plate removal must provide ample clearance for removal of stoppages, and allow service to the impeller, seal, wear plate or check valve without removing suction or discharge piping.

   b. A replaceable wear plate secured to the cover plate by weld studs and nuts shall be AISI 1015 HRS.

   c. In consideration for safety, a pressure relief valve shall be supplied in the cover plate. Relief valve shall open at 75-200 PSI.

   d. Two O-rings of Buna-N material shall seal cover plate to pump casing.

   e. Pusher bolt capability to assist in removal of cover plate. Pusher bolt threaded holes shall be sized to accept same retaining capscrews as used in rotating assembly.

   f. Easy-grip handle shall be mounted to face of cover plate.

3. Rotating Assembly: A rotating assembly, which includes impeller, shaft, mechanical shaft seal, lip seals, bearings, sealplate and bearing housing, must be removable as a single unit without disturbing the pump casing or piping. Design shall incorporate following features:

   a. Sealplate and bearing housing shall be cast iron Class 30. Separate oil filled cavities, vented to atmosphere, shall be provided for shaft seal and bearings. Cavities must be cooled by the liquid pumped. Three lip seals will prevent leakage of oil.

1) The bearing cavity shall have an oil level sight gauge and fill plug check valve. The clear sight gauge shall provide easy monitoring of the bearing cavity oil level and condition of oil without removal of the fill plug check valve. The check valve shall vent the cavity but prevent introduction of moist air to the bearings.

2) The seal cavity shall have an oil level sight gauge and fill/vent plug. The clear sight gauge shall provide easy monitoring of the seal cavity oil level and condition of oil without removal of the fill/vent plug.

3) Double lip seal shall provide an atmospheric path providing positive protection of bearings, with capability for external drainage monitoring.

b. Impeller shall be ductile iron, two-vane, semi-open, non-clog, with integral pump out vanes on the back shroud. Impeller shall thread onto the pump shaft and be secured with a lockscrew and conical washer.

c. Shaft shall be AISI 4140 alloy steel unless otherwise specified by the engineer, in which case AISI 17-4 pH stainless steel shall be supplied.

d. Bearings shall be anti-friction ball type of proper size and design to withstand all radial and thrust loads expected during normal operation. Bearings shall be oil lubricated from a dedicated reservoir. Pump designs which use the same oil to lubricate the bearings and shaft seal shall not be acceptable.

e. Shaft seal shall be oil lubricated mechanical type. The stationary and rotating seal faces shall be tungsten titanium carbide alloy. Each mating surface shall be lapped to within three light bands flatness (35 millionths of an inch), as measured by an optical flat under monochromatic light. The stationary seal seat shall be double floating by virtue of a dual O-ring design; an external O-ring secures the stationary seat to the sealplate, and an internal O-ring holds the faces in alignment during periods of mechanical or hydraulic shock (loads which cause shaft deflection, vibration, and axial/radial movement). Elastomers shall be viton. Cage and spring to be stainless steel. Seal shall be oil lubricated from a dedicated reservoir. The same oil shall not lubricate both shaft seal and shaft bearings. Seal shall be warranted in accordance with requirements listed under PART 1 - GENERAL of this section.

f. Pusher bolt capability to assist in removal of rotating assembly. Pusher bolt threaded holes shall be sized to accept same capscrews as used for retaining rotating assembly.

4. Adjustment of the impeller face clearance (distance between impeller and wearplate) shall be accomplished by external means.

a. Clearances shall be maintained by a four-point external shimless coverplate adjustment system, utilizing a four collar and four adjusting screw design allowing for incremental adjustment of clearances by hand as required. Each of the four points shall be lockable to prevent inadvertent clearance increases or decreases due to equipment vibration or accidental operator contact. The four-point system also allows for equal clearance gaps at all points between the impeller and wear plate. Requirement of realignment of belts, couplings, etc., shall not be acceptable. Coverplate shall be capable of being removed without disturbing clearance settings. Clearance adjustment systems that utilize less than four points will not be considered.

b. There shall be provisions for additional clearance adjustment in the event that adjustment tolerances have been depleted from the coverplate side of the pump. The removal of stainless-steel shims from the rotating assembly side of the pump shall allow for further adjustment as described above

c. Clearance adjustment which requires movement of the shaft only, thereby adversely affecting seal working length or impeller back clearance, shall not be acceptable.

5. Suction check valve shall be molded Neoprene with integral steel and nylon reinforcement. A blow-out center shall protect pump casing from hydraulic shock or excessive pressure. Removal or installation of the check valve must be accomplished through the coverplate opening, without disturbing the suction piping. Sole function of check valve shall be to save energy by eliminating need to reprime after each pumping cycle. Pumps requiring a suction check valve to assist reprime will not be acceptable.

6. Spool flanges shall be one-piece cast iron, class 30 fitted to suction and/or discharge ports. Each spool shall have one 1-1/4" NPT and one 1/4" NPT tapped hole with pipe plugs for mounting gauges or other equipment.

D. Serviceability

1. The pump manufacturer shall demonstrate to the engineer's satisfaction that consideration has been given to reducing maintenance costs.

2. No special tools shall be required for replacement of any components within the pump.

E. Gauge Kit

1. The pump manufacturer shall supply suction and discharge gauges for each pump graduated with increments appropriate for the suction and discharge pressures of the station.

2. See Specification Section 15400 for gauge construction requirements.

F. Drain Kit

1. Pumps to be supplied with a drain kit for ease of maintenance. The kit shall contain 10' length of reinforced plastic hose with a female quick connect fitting at one end, and factory installed drain fittings in each pump. Fittings include a stainless-steel pipe nipple, stainless steel bushing, stainless steel ball valve and aluminum male quick connect fitting.

G. Spare Parts Kit:

1. The following minimum spare parts shall be furnished with the pump station:

a. One pump mechanical seal

b. Required cover plate O-Ring(s)

c. One rotating assembly O-Ring(s)

d. One set of impeller clearance adjustment spacers

2.05 VALVES AND PIPING

A. The requirements of valves and piping listed in this specification are for factory-built prepackaged pump stations only.

B. Check Valve: Each pump shall be equipped with a full flow type check valve capable of passing a 3" spherical solid. Valve shall be constructed with flanged ends and fitted with an external lever and torsional spring. Valve seat shall be constructed of stainless steel, secured to the body to ensure concentricity, sealed by an O-ring, and shall be replaceable. The valve body shall be cast iron incorporating a clean-out port large enough to allow removal and/or replacement of the valve clapper without removing valve or piping from the line. Valve clapper shall have a molded neoprene seating surface incorporating low pressure sealing rings. Valve hinge pin and internal hinge arm shall be stainless steel supported on each end in brass bushings. Shaft nut shall have double O-rings which shall be easily replaceable without requiring access to interior of valve body. All internal hardware shall be stainless steel. Valve shall be rated at 175 PSI water working pressure, 350 PSI hydrostatic test pressure. Valves other than full flow type or valves mounted in such a manner that prevents the passage of a 3" spherical solid shall not be acceptable.

C. Plug Valve: A 3-way plug valve must allow either or both pumps to be isolated from the force main. The plug valve shall be non-lubricated, tapered type. Valve body shall be cast iron with flanged end connections drilled to 125-pound standard. The drip-tight shutoff plug shall be mounted in stainless steel bearings and shall have a resilient facing bonded to the sealing surface. Valve shall be operated with a single lever actuator providing lift, turn, and reseat action. The lever shall have a locking device to hold the plug in the desired position.

D. Station Enclosure Low Temperature Alarm

1. Pump station shall be supplied with a thermostat which shall monitor interior station temperature. The control shall incorporate an unpowered dry contact wired to terminal blocks for field connection to a remote alarm device. The

contact will close in the event that the temperature within the enclosure falls below approximately 35 degrees F.

E. Piping

1. Flanged header pipe shall be centrifugally cast, ductile iron, complying with ANSI/AWWA A21.51/C115 and class 53 thickness.

2. Flanges shall be cast iron class 125 and Comply with ANSI B16.1.

3. Pipe and flanges shall be threaded and suitable thread sealant applied before assembling flange to pipe.

4. Bolt holes shall be in angular alignment within 1/2 degree between flanges. Flanges shall be faced with a gasket finish having concentric grooves a minimum of 0.01-inch-deep by approximately 0.03 inch wide, with a minimum of three grooves on any given surface spaced a maximum of 1/4 inch apart.

F. Supports and Thrust Blocks: Contractor must ensure all pipes connected to the pump station are supported to prevent piping loads from being transmitted to pumps or station piping. Pump station discharge force main piping shall be anchored with thrust blocks where shown on the contract drawings.

2.06 DRIVE UNIT

A. Motors

1. Pump motors shall be 5 HP, horizontal TEFC, 1,800 RPM, NEMA design B with cast iron frame with copper windings, induction type, with class F insulation and 1.15 Service Factor for normal starting torque and low starting current characteristics, suitable for continuous service. The motors shall not overload at the design condition or at any head in the operating range as specified. Motors shall be suitable for operation using the utility power available specified in part 1 of this section.

2. Motors shall be tested in accordance with provisions of ANSI/IEEE Std. 112, Method B.

B. Drive Transmission

1. Power to pumps transmitted V-belt drive assemblies. The sheave/belt combination shall provide the speed ratio needed to achieve the specified pump operating conditions.

2. Each drive assembly shall utilize at least two V-belts providing minimum a combined safety factor of 1.5. Single belt drives or systems with a safety factor of less than 1.5 are not acceptable. Computation of safety factors shall be based on performance data published by the drive manufacturer.

3. Precise alignment tolerances of the drive assemblies shall be achieved by means of a belt/sheave laser alignment system resulting in the reduction of vibration, accelerated wear, and premature failure.

4. The pump manufacturer shall submit power transmission calculations which document the following:
   a. Ratio of pump/motor speed.
   b. Pitch diameter of driver and driven sheaves.
   c. Number of belts required per drive.
   d. Theoretical horsepower transmitted per belt, based on vendor's data.
   e. Center distance between pump and motor shafts.
   f. Arc-length correction factor applied to theoretical horsepower transmitted.
   g. Service factor applied to established design horsepower.
   h. Safety factor ratio of power transmitted/brake horsepower required.
5. Pump drives to be enclosed on all sides by a guard constructed of fabricated steel or combination of materials including expanded, perforated, or solid sheet metal. No opening to a rotating member shall exceed 1/2 inch.
   a. Guards must be completely removal without interference from any unit component and shall be securely fastened and braced to the unit base.
   b. Metal to be free from burrs and sharp edges. Structural joints shall be continuously welded. Rivet spacing on panels shall not exceed five inches. Tack welds shall not exceed four inch spacing.
   c. The guard shall be finished with one coat of gray W.R. non-lift primer and one coat of orange acrylic alkyd W.R. enamel in accordance with section 3, Color Definitions of ANSI 253.1; Safety Color Code for Marking Physical Hazards.

2.07 FINISH

A. Pumps, piping and exposed steel framework shall be cleaned prior to coating using an approved solvent wipe or phosphatizing cleaner. The part must thoroughly dry before paint application. Open joints shall be caulked with an approved polyurethane sealant. Exposed surfaces to be coated with two coats of a semi gloss white 2-component epoxy/polyamide to a dry film thickness of a minimum of 10 mils (5 mils minimum per coat). Coating shall be a high solids, 2 component epoxy/polyamide semi-gloss white coating for optimum illumination enhancement. The coating shall be corrosion, moisture, oil, and solvent resistant when completely dry. The factory finish shall allow for over-coating and touch-up for 6 months after coating. Thereafter, it will generally require sanding to accept a topcoat or touch-up coating. See Product Data Sheet for additional information.

2.08 ELECTRICAL CONTROL COMPONENTS

A. The pump station control panel will be tested as an integral unit by the pump station manufacturer. The control panel shall also be tested with the pump station as a complete working system at the pump station manufacturer's facility.

B. Panel Enclosure

1. Electrical control equipment shall be mounted within a common NEMA 1 stainless steel, dead front type control enclosures. Doors shall be hinged and sealed with a neoprene gasket and equipped with captive closing hardware. Control components shall be mounted on removable steel back panels secured to enclosure with collar studs.

2. All control devices and instruments shall be secured to the sub-plate with machine screws and lockwashers. Mounting holes shall be drilled and tapped; self-tapping screws shall not be used to mount and component. All control devices shall be clearly labeled to indicate function.

C. Branch Components

1. All motor branch and power circuit components shall be of highest industrial quality. The short circuit current rating of all power circuit devices shall be a tested combination or evaluated per the National Electrical Code Article 409. the lowest rated power circuit component shall be the overall control panel short circuit rating and shall not be less than the fault current available. The minimum control panel rating shall not be less than 10 kA, rms symmetrical. Control assemblies operating at 120 volts nominal or less may be provided with transformers which limit the fault current and may be rated less than the minimum required short circuit rating.

2. Circuit Breakers and Operating Mechanisms

a. A properly sized heavy duty circuit breaker shall be furnished for each pump motor. The circuit breakers must be sealed by the manufacturer after calibration to prevent tampering.

b. An operating mechanism installed on each motor circuit breaker shall penetrate the control panel door. A padlockable operator handle shall be secured on the exterior surface. Interlocks must prevent opening the door until circuit breakers are in "OFF" position. An additional mechanism(s) shall be provided on the circuit breaker permitting the breaker to be operated and/or locked with the control panel door in the open position.

3. Motor Starters

a. An open frame, across-the-line, NEMA rated magnetic starter with under-voltage release, and overload protection on all three phases, shall be furnished for each pump motor. Starters of NEMA size 1 and above shall allow addition of at least two auxiliary contacts. Starters rated "O", "OO", or fractional size are not acceptable. Power contacts to be

double-break type made of cadmium oxide silver. Coils to be epoxy molded for protection from moisture and corrosive atmospheres. Contacts and coils shall be easily replaceable without removing the starter from its mounted position. Each starter shall have a metal mounting plate for durability.

4. Overload Relays

   a. Overload relays shall be solid-state block type, having visual trip indication with trip-free operation. Electrically resetting the overload will cause one (1) normally open and one (1) normally closed isolated alarm/control contact to reset, thus re-establishing a control circuit. Trip setting shall be governed by solid-state circuitry and adjustable current setting. Trip classes shall be 10, 15 and 20. Additional features to include phase loss protection, selectable jam/stall protection and selectable ground fault protection.

   b. A reset pushbutton, mounted through the control panel door, shall permit resetting the overload relays without opening the door.

5. Three Phase Monitor

   a. The control panel shall be equipped to monitor the incoming power and shut down the pump motors when required to protect the motor(s) from damage caused by phase reversal, phase loss, voltage unbalance, high voltage, and low voltage. An adjustable time delay shall be provided to minimize nuisance trips. The motor(s) shall automatically restart, following an adjustable time delay, when power conditions return to normal.

6. Transient Voltage Surge Suppressor

   a. The control panel shall be equipped with a modular surge arrestor to minimize damage to the pump motors and control from transient voltage surges. The suppressor shall utilize thermally protected by heavy duty zinc-oxide varistors encapsulated in a non-conductive housing. Mechanical indicators shall be provided on each phase to indicate protection has been lost. The suppressor shall have a short circuit current rating of 200,000 Amps and a Maximum Discharge current rating [I_{max}] of 40,000 Amperes. Nominal discharge current [I_n] is 20,000 Amperes. Surge arrester according to UL 1449 3rd Edition, Type 2 component assembly.

7. Pump Start Delay

   a. The control circuit for pump #2 shall be equipped with a time delay to prevent simultaneous motor starts.

8. Panel Heater

a. The control panel shall be equipped with a panel heater to minimize the effects of humidity and condensation. The heater shall include a thermostat.

D. Control Circuit

1. A normal duty thermal-magnetic circuit breaker shall protect all control circuits by interrupting control power.

2. Pump mode selector switches shall permit manual start or stop of each pump individually or permit automatic operation under control of the liquid level control system. Manual operation shall override all shutdown systems, except the motor overload relays. Selector switches to be oil-tight design with contacts rated NEMA A300 minimum.

3. Pump alternation shall be integral to the liquid level controller. Provisions for automatic alternation or manual selection shall also be integral to the liquid level controller.

4. Six-digit elapsed time meter shall be displayed on the Integrinex™ Standard operator interface to indicate total running time of each pump in "hours" and "tenths of hours". Pump runtime shall be adjustable, and password protected.

5. A high pump temperature protection circuit shall override the level control and shut down the pump motor(s) when required to protect the pump from excessive temperature. A thermostat shall be mounted on each pump casing and connected to the Integrinex™ Standard. If casing temperature rises to a level sufficient to cause damage, the thermostat causes the Integrinex™ Standard to interrupt power to the motor. The Integrinex™ Standard will display an alarm banner indicating the motor stopped due to high pump temperature. The motor shall remain locked out until the pump has cooled and circuit has been manually reset. Automatic reset of this circuit is not acceptable.

6. A duplex ground fault receptacle providing 115 VAC, 60 Hz, single phase current, will be mounted on the side of the control enclosure. Receptacle circuit shall be protected by a 15-ampere thermal-magnetic circuit breaker.

7. The lift station shall be equipped with a 3 KVA stepdown transformer to supply 115-volt, AC, single phase for the control and auxiliary equipment. The primary and secondary side of the transformer to be protected by a thermal magnetic circuit breaker, sized to meet the power requirements of the transformer. An operating mechanism shall penetrate the control panel door and a pad lockable operator handle shall be secured on the exterior surface. Interlocks must prevent opening the door until circuit breakers are in "OFF" position. An additional mechanism(s) shall be provided on the circuit breaker permitting the breaker to be operated and/or locked with the control panel door in the open position.

8. Wiring

a. The pump station, as furnished by the manufacturer, shall be completely wired, except for power feed lines to the branch circuit breakers and final connections to remote alarm devices.

b. All wiring, workmanship, and schematic wiring diagrams shall comply with applicable standards and specifications of the National Electric Code (NEC).

c. All user serviceable wiring shall be type MTW or THW, 600 volts, color coded as follows:

1) Line and Load Circuits, AC or DC power.....Black

2) AC Control Circuit Less Than Line Voltage.....Red

3) DC Control Circuit.....Blue

4) Interlock Control Circuit, from External Source.....Yellow

5) Equipment Grounding Conductor.....Green

6) Current Carrying Ground.....White

7) Hot With Circuit Breaker Open.....Orange

d. Control circuit wiring inside the panel, with exception of internal wiring of individual components, shall be 16 gauge minimum, type MTW or THW, 600 volts. Power wiring to be 14 gauge minimum. Motor branch wiring shall be 10 gauge minimum.

e. Motor branch and other power conductors shall not be loaded above the temperature rating of the connected termination. Wires must be clearly numbered at each end in conformance with applicable standards. All wire connectors in the control panel shall be ring tongue type with nylon insulated shanks. All wires on the sub-plate shall be bundled and tied. All wires extending from components mounted on door shall terminate at a terminal block mounted on the back panel. All wiring outside the panel shall be routed through conduit.

f. Control wires connected to door mounted components must be tied and bundled in accordance with good commercial practice. Bundles shall be made flexible at the hinged side of the enclosure. Adequate length and flex shall allow the door to swing full open without undue stress or abrasion. Bundles shall be held on each side of hinge by mechanical fastening devices.

9. Conduit

a. Factory installed conduit shall conform to following requirements:

1) All conduit and fittings to be UL listed.

2) Liquid tight flexible metal conduit to be constructed of smooth, flexible galvanized steel core with smooth abrasion resistant, liquid tight polyvinyl chloride cover.

3) Conduit to be supported in accordance with articles 346, 347, and 350 of the National Electric Code.

4) Conduit shall be sized according to the National Electric Code.

10. Grounding

a. Station manufacturer shall ground all electrical equipment inside the pump station to the control panel back plate. All paint must be removed from the grounding mounting surface before making final connection.

b. The contractor shall provide an earth driven ground connection to the pump station at the main grounding lug in accordance with the National Electric Code (NEC).

11. Equipment Marking

a. Permanent corrosion resistant name plate(s) shall be attached to the control and include following information:

1) Equipment serial number

2) Control panel short circuit rating

3) Supply voltage, phase and frequency

4) Current rating of the minimum main conductor

5) Electrical wiring diagram number

6) Motor horsepower and full load current

7) Motor overload heater element

8) Motor circuit breaker trip current rating

9) Name and location of equipment manufacturer

b. Control components shall be permanently marked using the same identification keys shown on the electrical diagram. Labels shall be mounted adjacent to device being identified.

c. Switches, indicators, and instruments mounted through the control panel door shall be labeled to indicate function, position, etc. Labels shall be mounted adjacent to, or above the device.

2.09 LIQUID LEVEL CONTROL

A. The manufacturer of the liquid level control system must be ISO 9001:2000 revision certified, with scope of registration including design control and service after sales activities.

B. The level control system shall start and stop the pump motors in response to changes in wet well level, as set forth herein.

C. The level control system shall be capable of operating as an air bubbler type level control system, submersible transducer type system, or ultrasonic transmitter type system.

D. The level control system shall utilize alternation to select first one pump, then the second pump, to run as lead pump for a pumping cycle. Alternation shall occur at the end of a pumping cycle, or in the event of excessive run time.

E. The level control system shall utilize an electronic pressure switch which shall continuously monitor the wet well level, permitting the operator to read wet well level at any time. Upon operator selection of automatic operation, the electronic pressure switch shall start the motor for one pump when the liquid level in the wet well rises to the "lead pump start level". When the liquid is lowered to the "lead pump stop level", the electronic pressure switch shall stop this pump. These actions shall constitute one pumping cycle. Should the wet well level continue to rise, the electronic pressure switch shall start the second and/or third pump (if required) when the liquid reaches the "lag pump start level", or “standby pump start level” so that all pumps are operating. These levels shall be adjustable as described below.

1. The electronic pressure switch shall include integral components to perform all pressure sensing, signal conditioning, EMI and RFI suppression, DC power supply and 120-volt outputs. Comparators shall be solid state and shall be integrated with other components to perform as described below.

2. The electronic pressure switch shall be capable of operating on a supply voltage of 12-24Vdc in an ambient temperature range of -10 degrees C (14 degrees F) through 55 degrees C (131 degrees F). Ingress Protection of IP56 for indoor use with closed cell neoprene blend gasket material. Evaluated by Underwriters Laboratories for Pollution Degree 2 device for U.L. and cU.L. Control range shall be 0 to 33.3 feet of water with an overall repeat accuracy of (plus/minus) 0.1 feet of water. Memory shall be non-volatile. A Battery backed real time clock shall be standard.

3. Eleven optically isolated, user defined digital inputs for pump and alarm status. Rated at 10mA at 24Vdc. Eight digital output relays (mechanical contacts), configurable for pump start/stop or alarms. Three relays rated at 12 Amp @ 28Vdc and 120Vac, five relays rated at 3 Amp @ 30Vdc and 120Vac. The electronic pressure switch shall consist of the following integral components: pressure sensor, display, electronic comparators, digital inputs and digital output relays.

   a. The internal pressure sensor shall be a strain gauge transducer and shall receive an input pressure from the air bubbler system. The transducer shall convert the input to a proportional electrical signal for distribution to the display and electronic comparators. The transducer output shall be filtered to prevent control response to level pulsations or surges. The transducer range shall be 0-14.5 PSI, temperature compensated from -40 degrees C (-40 degrees F) through 85 degrees C (185 degrees F), with a repeat accuracy of (plus/minus) 2.5% full scale about a fixed temperature. Transducer overpressure rating shall be 3 times full scale.

b. The electronic pressure switch shall incorporate a digital back lighted LCD panel display which, upon operator selection, shall indicate liquid level in the wet well, and pump status indication for up to 3 pumps. The display shall include a 128 x 64 bit resolution LCD to read out directly in feet of water, accurate to within one-tenth foot (0.1 foot), with a full scale indication of not less than 12 feet. The display shall be easily convertible to indicate English or metric units.

c. Level adjustments shall be electronic comparator set-points to control the levels at which the lead, lag and standby pumps start and stop. Each of the level settings shall be easily adjustable with the use of membrane type switches, and accessible to the operator without opening any cover panel on the electronic pressure switch. Controls shall be provided to permit the operator to read the selected levels on the display. Such adjustments shall not require hard wiring, the use of electronic test equipment, artificial level simulation or introduction of pressure to the electronic pressure switch.

d. Each digital input can be programmed as pump run, pump HOA, pump high temp, pump moisture/thermal, starter failure (FVNR, RVSS, VFD), and phase failure. Inputs are used for status and alarm indication.

e. Each output relay in the electronic pressure switch shall be hard contact mechanical style. Each relay input shall be optically isolated from its output and shall incorporate zero crossover switching to provide high immunity to electrical noise. Each output relay shall have an inductive load rating equivalent to one NEMA size 3 contactor. A pilot relay shall be incorporated for loads greater than a size 3 contactor.

4. The electronic pressure switch shall be equipped with alarm banners with time and date history for displaying alarm input notification. Alarm history will retain a 16 of the most recent alarm events.

5. The electronic pressure switch shall be equipped with pump start/stop and alarm input delay(s) that have an adjustable delay set points.

6. An Antiseptic function with a built-in timer shall be incorporated in the electronic pressure switch to prevent the well from becoming septic.

7. The electronic pressure switch shall be capable of jumping to next available pump if current pump is out of service due to pump failure or manual selection. Circuit design in which application of power to the lag pump motor starter is contingent upon completion of the lead pump circuit shall not be acceptable.

8. The electronic pressure switch shall be equipped with a simulator system capable of performing system cycle testing functions.

9. The electronic pressure switch shall be capable of calculating and displaying pump elapse run time. The elapse run time is resettable and adjustable.

10. The electronic pressure switch shall have internal capability of providing automatic simplex, duplex, and triplex alternation, manual selection of pump

sequence operation, and alternation in the event of 1-24 hours of excessive run time.

11. The electronic pressure switch shall be equipped with a security access code to prevent accidental set-up changes and provide liquid level set-point lock-out. The supervisor access code is adjustable.

12. The electronic pressure switch shall be equipped with one (1) 0-33 ft. W.C. input, one (1) scalable analog input of either 0-5Vdc, or 4-20mA, and one (1) scalable analog output of either 0-5Vdc, 0-10Vdc or 4-20mA. Output is powered by 10-24Vdc supply. Load resistance for 4-20mA output shall be 100-1000 ohms.

13. The electronic pressure switch shall include a DC power supply to convert 120Vac control power to 12 or 24Vdc power. The power supply shall be 500 mA (6W) minimum and be UL listed Class II power limited power supply.

14. The electronic pressure switch shall be equipped with an electronic comparator and mechanical output relay to alert maintenance personnel to a high liquid level in the wet well. An alarm banner, visible on the front of the controller, shall indicate that a high wet well level exists. The alarm signal shall be maintained until the wet well level has been lowered and the circuit has been manually reset. High water alarm shall be furnished with a dry contact wired to terminal blocks.

15. The electronic pressure switch shall be equipped with an electronic comparator and mechanical output relay to alert maintenance personnel to a low liquid level in the wet well. An alarm banner, visible on the front of the controller, shall indicate that a low wet well level exists. The alarm signal shall be maintained until the cause for the low wet well level has been corrected and the circuit has been manually reset. A low liquid level condition shall disable all pump motors. When the wet well rises above the low level point, all pump motors shall be automatically enabled. Low water alarm shall be furnished with a dry contact wired to terminal blocks.

16. Integrinex Standard Analog Output circuit will be furnished with transient voltage surge suppression to protect related equipment from induced voltage spike from lighting.

F. An alarm silence pushbutton and relay shall be provided to permit maintenance personnel to de-energize the audible alarm device while corrective actions are under way. After silencing the alarm device, manual reset of the alarm condition shall clear the alarm silence relay automatically. The pushbutton shall be a membrane style button integral to the Integrinex Standard level controller.

G. Air Bubbler System

1. The primary level control system shall be the air bubbler type, containing air bubbler piping which extends into the wet well. A pressure sensor contained within the electronic pressure switch shall sense the air pressure in this piping to provide wet well level signals for the remainder of the level control system.

2. Two vibrating reed, industrial rated, air pumps shall be furnished to deliver free air at a rate of approximately 5 cubic feet per hour and a pressure not to exceed 7 psi. Liquid level control systems utilizing air compressors delivering greater quantities of air at higher pressures, requiring pressure reducing valves, air storage reservoirs, and other maintenance nuisance items will not be acceptable. A selector switch shall be furnished to provide manual alternation of the air pumps. The switch shall be connected in such a manner that either pump may be selected to operate continuously. The selector switch shall be oil-tight design with contacts rated NEMA A300 minimum.

3. An air bell constructed of PVC 3 inches in diameter shall be provided for installation at the outlet of the air bubbler line in the wet well. The air bell shall have a 3/8" NPT tapped fitting for connection to the bubbler line.

4. An air flow indicator gauge shall be provided and connected to the air bubbler piping to provide a visual indication of rate of flow in standard cubic feet per hour.

H. Backup Float System

1. The backup level control system shall be provided in the form of 5 float switches provided in accordance with Specification Section 16902.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Contractor shall off-load equipment at installation site using equipment of sufficient size and design to prevent injury or damage. Station manufacturer shall provide written instruction for proper handling. Immediately after off-loading, contractor shall inspect complete pump station and appurtenances for shipping damage or missing parts. Any damage or discrepancy shall be noted in written claim with shipper prior to accepting delivery. Validate all station serial numbers and parts lists with shipping documentation. Notify the manufacturer’s representative of any unacceptable conditions noted with shipper.

3.02 INSTALLATION

A. Install, level, align, and lubricate pump station as indicated on project drawings. Installation must be in accordance with written instructions supplied by the manufacturer at time of delivery.

B. Suction pipe connections shall be vacuum tight. Fasteners at all pipe connections must be tightened to the required torque. Install pipe with supports and thrust blocks to prevent strain and vibration on pump station piping. Install and secure all service lines (level control, air release valve or pump drain lines) as required in wet well.

C. Check motor and control data plates for compatibility to site voltage. Install and test the station ground prior to connecting line voltage to station control panel.

D. Prior to applying electrical power to any motors or control equipment, check all wiring for tight connection. Verify that protective devices (fuses and circuit breakers) conform to project design documents. Manually operate circuit breakers and switches to ensure operation without binding. Open all circuit breakers and disconnects before connecting utility power. Verify line voltage, phase sequence and ground before actual start-up.

E. After all anchor bolts, piping and control connections are installed, completely fill the grout dam in the pump station base with non-shrink grout.

3.03 FIELD QUALITY CONTROL

A. Operational Test

1. Prior to acceptance by owner, an operational test of all pumps, drives, and control systems shall be conducted to determine if the installed equipment meets the purpose and intent of the specifications. Tests shall demonstrate that all equipment is electrically, mechanically, structurally, and otherwise acceptable; it is safe and in optimum working condition; and conforms to the specified operating characteristics.

2. After construction debris and foreign material has been removed form the wet well, contractor shall supply clear water volume adequate to operate station through several pumping cycles. Observe and record operation of pumps, suction and discharge gage readings, ampere draw, pump controls, and liquid level controls. Check calibration of all instrumentation equipment test manual control devices, and automatic control systems. Be alert to any undue noise, vibration or other operational problems.

B. Manufacturer's Start-up Services

1. Coordinate station start-up with manufacturer's technical representative. The representative or factory service technician will inspect the completed installation. He will calibrate and adjust instrumentation, correct or supervise correction of defects or malfunctions, and instruct operating personnel in proper operation and maintenance procedures.

3.04 CLEANING

A. Prior to acceptance, inspect interior and exterior of pump station for dirt, splashed material or damaged paint. Clean or repair accordingly. Remove from the job site all tools, surplus materials, scrap and debris.

3.05 PROTECTION

A. The pump station should be placed into service immediately. If operation is delayed, drain water from pumps and piping. Open motor circuit breakers and protect station controls and interior equipment from cold and moisture. Station is to be stored and maintained per manufacturer's written instructions.

PART 4 – SPECIAL PROVISIONS

None Used.

END OF SECTION

SECTION 15010
GENERAL MECHANICAL PROVISIONS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes furnishing and installing mechanical accessories and requirements necessary for the completion of the Work whether or not specifically shown or specified.

B. Items include, but are not limited to:

1. Piping Hangers and Supports.
2. Insulation Fire Retardant Requirement.
3. Accessibility and Access Panels.
4. Power Actuated Anchors.
5. Rotating Equipment Alignment.

C. Additional requirements are specified in Sections 01350 and 11050.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:
   a. Descriptive information on all mechanical items.
   b. Drawings locating anchors, inserts, and supports for piping, including vendor data for each component.
2. Information for the Record:
   a. Alignment procedures and acceptable runout tolerances for each piece of connected equipment.
   b. Shaft and bore sizes and tolerances for couplings and instructions for coupling installation.
   c. A report of coupling alignment readings for each coupling and driven machine combination, and sizes of all anchor bolt or equipment base shims.

PART 2 PRODUCTS

2.01 PIPING HANGERS AND SUPPORTS

A. The manufacturer's names and catalog numbers shown in the following paragraphs have been used as a guide to type, style, and materials of construction only. Anvill, Unistrut, or equal.

B. Contractor shall furnish and install all pipe supports, hangers, harnessing, expansion joints, expansion loops, and inserts required to support the piping and valves. Supports shall be designed and spaced to secure pipe in place without sag or undue stress on any pipe, fitting, equipment, or valve. Piping that is close to the floor may be supported on concrete piers. Piping near walls may be supported by wall brackets. Piping at equipment and valves, etc., shall be supported so that the equipment and valves can be removed without additional pipe supports. Piping shall not introduce any strains or distortion to connected equipment. Overhead lines shall be installed directly on supports, or suspended by hangers or hanger rods. Where piping is supported from the ceiling, inserts shall be poured in the concrete slab flush with the bottom of the slab. Adequate lateral support shall be provided to prevent noticeable lateral movement of the piping either during operation, or from a lateral load of 300 pounds applied at any point. All hanger design, anchoring, support, etc. shall be the responsibility of the Contractor. Design loads shall not exceed the manufacturer's recommended loads.

C. Types of Supports:

1. All horizontal piping 4-inch and larger with inverts 2-feet or less from a finished floor shall be supported by concrete saddle supports, unless otherwise specified in Part 4 of this Section.

2. Beam clamps shall be used where piping is supported from steel structure of building. Clamps shall be selected on basis of load to be supported. Beam clamps shall be malleable iron with bolt, nut, and pocket threaded for rod connection as required to fit beams. C-clamp type shall only be hung from truss panel points unless otherwise approved by the Engineer.

3. In precast slab areas supports shall be hung from tabs. Tabs shall not be overloaded. Contractor shall not drill into precast slabs unless approved by the Engineer.

4. Cast-in inserts shall be used for suspending hangers from concrete. For heavier loads, insert shall be ceiling type, individual inserts; Anvill CB - Universal concrete inserts, Figure 282, or equal. For lighter loads, inserts shall be Unistrut P-3200 series, or equal. The preformed channel members shall be 1-5/8-inch by 1-3/8-inch with a 12-gauge (.105 inch) material thickness. Anchors shall be at 4-inch on center maximum, and extend into concrete a minimum of 2-3/4-inch. End caps and/or end cap anchors shall be provided to prevent concrete seepage into channels. All channels shall have a pre-galvanized finish, and all accessories shall be electro-galvanized. Insert shall not be overloaded.

5. Vertical piping shall be supported at base by hanger placed in horizontal line near riser, or by base fitting set on pedestal or foundation. Risers shall be laterally supported at intermediate points with riser clamps with two-point bearing as required to make rigid. Riser clamps shall be wrought steel, with extension lugs, bolt, and nuts; Anvill Figure 261, or equal. Offset pipe clamps, Anvill Figure 103, or equal, may also be used. Use only in unfinished areas where approved by the Engineer. Anvill Figure CT-121, or equal, shall be used for copper pipe.

6. Unless otherwise noted, hangers shall be as follows:

   a. Uninsulated piping 2-inch and smaller, Anvill Figure 97, or equal malleable iron adjustable nut and steel band.

   b. Uninsulated piping 2-inch and larger, Anvill Figure 260, or equal, galvanized steel adjustable clevis type.

   c. Uninsulated copper tubing, Anvill Figure CT-69, or equal, carbon steel ring and knurled swivel iron adjusting nut completely copper plated.

   d. Insulated piping, Anvill Figure 260, Elcen, or equal, clevis hangers. An insulation protection shield, Anvill Figure 167, or equal, shall be installed over the insulation in 180-degree segment, minimum 12-inch long. The shield shall be galvanized steel and shall vary in thickness from 18-gauge to 12-gauge, according to pipe size, as required to prevent crushing of the insulation. Anchors and guides shall be installed as required. Where roller supports are required due to expansion or contraction, Anvill Figure 171 roller hangers, Anvill Figure 175 roller chairs, Anvill Figure 271 pipe roll stands, or equal shall be used.

7. Trapeze Hangers and Brackets:

   a. Where several pipes occur at the same elevation, trapeze type hangers or other equivalent types may be used.

   b. For heavier loads, trapeze hangers shall be structural steel channels suspended from threaded rods. Channels shall be galvanized and sized for specific loads. For 12-inch piping and larger, short pieces of angle (1/4-inch minimum thickness) shall be welded to the channel such that pipe circumference will be supported at 3 points approximately 30 degrees apart. Fabricated saddles supporting a 60-degree minimum segment of the pipe may also be used. Standard black carbon steel “U”-bolts, Anvill Figure 137, or equal, shall be used to secure piping up to 36-inch diameter to structural channels. For lighter loads, trapeze hangers shall be preformed channels. Channel members shall be 1-5/8-inch by 1-5/8-inch with a 12-gauge (.105) material thickness. They shall be Unistrut Series P-1000, or equal, with a pre-galvanized finish. All fittings, spring nuts, nuts, and bolts shall be electrogalvanized. Steel threaded rod hangers shall be galvanized.

c. Brackets shall be Anvill Figure 195, or equal, as required for weight of pipe. Brackets for use with preformed Unistrut or equal channels shall be fabricated from 12-gauge material, compatible with the 1-5/8-inch square channel members. Unistrut or equal brackets shall be galvanized. All fabricated steel brackets used to support piping in or above tanks, channels, and flumes shall be hot dip galvanized after fabrication and all fasteners shall be galvanized.

d. The following general rules shall be followed for attachments:

1) Uninsulated steel piping, use Unistrut Series P-1109 through P-1126, or equal clamps.

2) For copper tubing, use Unistrut Series P-2024CC through P-2070CC clamps, or equal.

3) Insulated piping 2-inch and smaller, use Anvill Figure 167, 18-gauge galvanized steel shield over the insulation, in 180-degree segments minimum 12-inch long with Anvill Figure 271, or equal, clamps.

4) Insulated piping 2-1/2-inch and larger, use a protection saddle, Anvill Figure 160 through 166, or equal, with Anvill Figure 271, or equal, roller supports.

8. In tunnels, pipe galleries, and where piping is racked on multiple hangers, supported with the use of prefabricated structural support channels, the piping attachments shall be as specified for Trapeze Hangers.

D. Anchorage shall be provided to resist thrust due to temperature changes, changes in diameter or direction, or dead ending. Anchors shall be located as required to force expansion and contraction movement to occur at expansion joints, loops or elbows, and as required to prevent excessive bending stresses and opening of mechanical couplings. Anchors shall be suitable for the location of installation and shall be designed to withstand not less than five times the anchor load. Vertical pipes shall be anchored by means of clamps welded around pipes and secured to wall or floor construction. Anchorage for temperature changes shall be centered between elbows and mechanical joints used as expansion joints. Anchorage for bellow type expansion joints may be located adjacent to the joint.

1. Pipe guides shall be provided adjacent to bellows type expansion joints. Guides shall be placed on both sides of expansion joints except where anchors are adjacent to the joint. Unless otherwise indicated on the drawings, one guide shall be within four pipe diameters from the joining and a second guide within 14 pipe diameters from the first guide. Pipe supports shall allow adequate movement; pipe guides shall not be used for support. Guide and spider shall be of sufficient size to clear pipe insulation and long enough to prevent overtravel of spider and cylinder. Pipe guides shall be Anvill Figure 255, or equal, and shall be installed as recommended by the manufacturer.

2. Unless closer spacing is indicated on the drawings, the maximum spacing for pipe supports and expansion joints shall be:

Type of Pipe	Pipe Support Max. Spacing, ft	Max Run Without Expansion Joint, Loop, or Bend, Ft	Expansion Joint Max. Spacing, ft	Type of Expansion Joints
Cast Iron/Ductile Iron	10 (Note 4)	80	80	Mechanical Couplings
Steel for hot water heating				
1-1/4-inch and smaller	7	30	100	Note 1
1-1/2- to 4-inch	10	30	100	Note 1
Over 4-inch	15	30	100	Note 1
Steel for other services				
1-1/4-inch and smaller	7	30	100	Note 1
1-1/2- to 4-inch	10	30	100	Note 1
Over 4-inch	15	80	80	Mechanical Couplings
Copper for hot water				
1-inch and smaller	5	20	100	Note 1
Over 1-inch	7	20	100	Note 1
Copper for other services				
1-inch and smaller	5	--	--	None required
Over 1-inch	7	50	100	Note 1
PVC				
1/8- to 1-inch	Continuous Support (Note 2)	20	60	Note 1
1-1/4- to 2-inch	4	20	60	Note 1
Over 2-inch	6	20	60	Note 1
Fiberglass reinforced plastic				
3-inch and smaller	6	60	100	Note 1
Over 3-inch	8	40	100	Note 1
Acid Waste				
Tempered glass	8 (Note 3)	--	--	None required
High silicon iron	15 (Note 4)	--	--	None required
Cast iron soil	10 (Note 4)	--	--	None required

Notes:

1. Expansion joint fittings as specified in the applicable miscellaneous piping section.
2. Hanger and bracket spacing may be increased where PVC pipe is provided continuous support.
3. At least two properly padded supports for each pipe section.
4. At least one support for each pipe section.

3. Pipe expansion joints shall be installed within 5-feet of all structural isolation or expansion joints. Expansion joints shall be as specified in the appropriate Section of this Contract, and submitted for approval.

E. Expansion Loops - Where fabricated expansion loops are shown on the drawings or deemed by the Contractor to control the system, expansion loops shall be designed by the Contractor and submitted for approval.

F. Use correct size hanger to allow for increased diameters of line caused by pipe covering. The Contractor will not be allowed to cut or reduce specified covering to allow application of hangers, unless otherwise specified.

G. Galvanic Protection - A dielectric material shall be placed between pipe and supports when dissimilar metals are used. A flexible elastomer material, Unistrut unicushion P-2600, or equal, may be used. A thermoplastic elastomer cushion, the Unistrut Cush-A-Clamp or equal, may also be used. In general, if galvanized supports are used, all accessories shall be galvanized. If carbon steel supports are used, all accessories shall be carbon steel.

H. Support mechanical coupling pipe at each joint.

I. Other means of pipe supports not be used unless approved by the Engineer.

J. Pipe supports shown on the Drawings shall be provided and do not relieve the Contractor of any of the requirements in this Section.

2.02 FIRE RETARDANT INSULATIONS

A. All insulation material (insulation, jackets, adhesives, cements, mastics, sealers, coatings, and finishes) shall have composite Fire and Smoke Hazard ratings as tested under ASTM E84, NFPA 255, and UL 723, not exceeding as follows: (unless noted otherwise in UBC)

Flame Spread 25 Smoke Developed 50

B. All surfaces shall be clean, dry, and free of oil and grease before insulation, adhesives, or mastics are applied.

C. All joints shall be tight with insulation lengths and segments tightly butted against each other. Where lengths or segments are cut, cuts must be smooth and square. All insulation shall be continuous through wall and ceiling openings. Insulation shall be continuous through pipe hangers. At pipe hangers, use rigid pipe covering finished the same as the adjacent pipe covering.

D. Where vapor barrier jackets are used on cold surfaces, insulation must be applied with vapor seal integrity maintained throughout the entire system.

E. All pipe insulation shall be pre-molded, and be split ready for application.

PART 3 EXECUTION

3.01 ACCESSIBILITY AND ACCESS PANELS

A. Install work to be readily accessible for operation, maintenance, and repair. Minor deviations from Drawings may be made; however, major changes shall not be made without approval of the Engineer.

B. Where valves, traps, or other specialties are concealed in the construction or behind a wall or ceiling surface, the Contractor shall furnish and install an access panel of adequate size to permit adjustment or service of concealed device. Panels shall be of a design suitable for installation in the material forming the finished surface in which each is mounted. Provide access doors in ductwork and equipment housing and wherever required for access to internals. Minimum door size shall be 24-inch by 24-inch unless duct is less than 24-inch wide, then door size to be same as duct width.

C. Wherever practical, the Contractor shall group valves, traps, dampers, etc., in such a way as to be accessible from a single panel and eliminate as many access panels as possible.

D. Ceiling access shall be required in gypsum wallboard, plaster, and other ceilings, etc., and in all locations as required to gain access or service mechanical components. Frames shall be constructed of 16-gauge steel. Panels shall be of the material used in the ceiling construction in which they are installed.

E. Access doors in insulated walls, floors, or ceilings shall be insulated equally to their surroundings.

3.02 POWER ACTUATED ANCHORS

A. Power actuated anchoring devices shall not be used at floors, columns, beams, precast concrete, where so using causes cracking, spalling, or other deformation to these members. In no case, will such anchors be used less than 4-inch from any corner nor change in direction of concrete surface to which anchor is attached.

3.03 ROTATING EQUIPMENT ALIGNMENT

A. To aid in the field alignment of all equipment base plate mounted rotating equipment, push bolts (jacking bolts) shall be furnished and welded to the base plate.

B. All rotating equipment shall be field checked for alignment after installation and initial operation. The equipment shall be at operating temperature. The minimum method of indicating alignment will be the “16-point” method. Other proposed methods must be submitted for approval to the Engineer.

C. The alignment results are to be submitted for record. They are to include the final set of indicator readings and a plan view sketch of the motor and driven machine base, and the thickness of shims for each shimmed anchor bolt. The thickness of shims shall not exceed 0.25 inches.

PART 4 SPECIAL PROVISIONS

4.01 SUPPORT MATERIAL SCHEDULE

A. Exterior – All exterior supports shall be 304 stainless steel.

END OF SECTION

SECTION 15210
PIPING

PART 1 GENERAL

1.01 SCOPE

A. This Section includes the furnishing and installing of all pipelines 4-inch diameter and larger shown on the Drawings or as required to complete the Work.

B. Piping less than 4-inch diameter, will be included under other Sections unless otherwise specified.

C. Material to be furnished and installed, but not limited to:

1. All pipe, fittings, specials, bends, beveled pipe, adapters, bulkheads, stoppers, plugs, joint restraints, joints and jointing materials.
2. Pipe supports other than those specified in Section 15010.
3. Granular material for bedding and encasement of pipelines.
4. Class B concrete as specified in Section 03300 for blocking and encasement of pipelines.
5. Make connections to all existing and/or new facilities and provide temporary services.
6. Install temporary plugs and/or stoppers and harnessing.
7. Test and clean pipelines.
8. Sterilize water mains.

D. The Contractor shall make adequate field measurements before new piping is fabricated.

E. All wall, floor, and roof penetrations and any building modifications which are required for the installation of the Work under this Section shall be included in this Section.

F. Instruments which are to be located in pipelines 4-inch in diameter and larger shall be furnished under Division 16 and installed under this Section.

1.02 QUALITY CONTROL

A. Laboratory Services - Laboratory testing services shall be provided as specified under Section 01410 of the Specifications.

B. Field Inspection:

1. All pipe sections, specials, and jointing materials shall be carefully examined for defects and no piece shall be laid that is known to be defective. Any defective piece discovered installed shall be removed and replaced with a sound one in a

manner satisfactory to the Resident Project Representative at the Contractor's expense.

2. Defective material shall be marked with lumber crayon and removed from the job site before the end of the following day.

C. Field Testing:

1. All materials, process of manufacturing, and finished pipe shall be subject to inspection and approval.

2. The Resident Project Representative may select one sample of pipe on the job site of each production run of each size and type of pipe to be tested by the laboratory. The Contractor shall furnish the first test piece or pipe core and any additional samples required because of failures. Should the sample fail to meet specifications, retests shall be conducted by the laboratory in conformance with the specifications.

D. To assure uniformity and compatibility of piping components in grooved piping systems, all grooved products utilized shall be supplied by a single manufacturer. Grooving tools shall be supplied by the same manufacturer as the grooved components.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300 showing: layout plan and dimensions, schedule of pipe fittings and specials, materials and class for each size and type of pipe, joint details, and any special provisions required for assembly.

B. Shop drawings shall be drawn to not less than 1/4-inch scale and show the laying length and piece mark for each section of pipe and fitting.

C. Drawings shall show the position and elevation of valves, pumps, and/or other equipment served by the various pipe systems.

D. The concrete pipe manufacturer's certificate shall state that the materials have been sampled and tested in accordance with the provision for and meet the requirements of the designated specification. The certificate shall be signed by an authorized agent of the manufacturer.

E. If directed by the Engineer, each certificate shall be accompanied by a report showing test results compared to specification requirements. Test specimens shall be selected in conformance with the designated specification, except that no less than two tests shall be made for each production run of each size, type, and class of pipe furnished, and further, that in case tests are unsatisfactory, additional tests shall be made to the maximum number in the referenced ASTM Specification.

F. Before fabrication of any concrete pressure pipe, fittings, or specials, the Contractor shall furnish to the Engineer at least six copies of the design calculations for the pipe showing the calculations to arrive at the gross wrapping stress in wire; initial and resultant stresses in concrete, cylinder, and wire; internal pressure when compression in concrete is zero; compression strength of concrete at time of wrapping; and calculations

to show stress, conditions, and the core and steel when the pipe is simultaneously subjected to the design pressure and external loads. The Contractor shall also furnish the full details of all pipe, specials, and fittings, and a laying schedule showing dimensions, details, and specifications of all pieces.

G. Submit a schedule of all proposed pipe escutcheons.

H. Other submittals may appear in Part 4 of this Section.

I. Any proposed grooved joint couplings and fittings shall be shown on drawings and product submittals, and shall be specifically identified with the applicable style or series number.

PART 2 PRODUCTS

2.01 PROCESS AND PRESSURE PIPE

A. Ductile Iron Pressure Pipe (DIP):

1. Ductile Iron Pressure Pipe (DIP) shall conform to ANSI A21.51 or AWWA C151 and shall be pressure class 350 psi for sizes 12-inch and below, and pressure class 300 psi for larger sizes unless otherwise specified herein.

2. Flanged fittings shall be ductile iron and conform to ANSI A21.15 or AWWA C115. All fittings shall have a pressure rating of 250 psi for all pipe sizes unless otherwise specified.

3. Ductile Iron pipe inside buildings or structures shall be joined with flanged, or mechanical joints as shown on the Drawings, or as indicated in the pipe schedule. All mechanical joints shall have retainer glands. Flanges shall comply with ANSI 21.15 or AWWA C115 and shall be ANSI 125-pound drilling, unless otherwise specified. Flanged joints shall have full face 1/8-inch rubber gaskets or of thickness and type approved by the Engineer. The pipe shall not be threaded or flanged in the field. Flanges shall be firmly bolted with machine, stud, or tap bolts of the proper size and number. Within buildings the bolts and nuts shall be of the best quality mild steel, with true threads, meeting the requirements of ANSI B16.1.

4. Flange adapters for plain end pipe (not fittings), where specified, shown on Drawings, or approved by Engineer shall be a restrained flange adapter. The restraining mechanism shall be multiple gripping wedges set against the pipe wall. Twist off nuts shall be used to ensure proper actuation of the restraining device. The restrained flange adapter shall be Series 2100 Megaflange by Ebaa Iron, Inc., or equal.

5. Couplings, if required or permitted, shall be Dresser Style 38, Rockwell, or equal. Restrained coupling shall be Dresser Style 167 Lock Coupling, Rockwell, or equal.

2.02 PROCESS AND PRESSURE PIPE NUTS AND BOLTS

A. Nuts and bolts used on buried pressure pipe and fittings in contact with earth shall be Cor-Blue coated low alloy steel and have a minimum yield strength of 45,000 psi complying with ANSI A21.11 and AWWA C111.

B. Nuts and bolts encased in grout on concrete pressure pipe shall conform to recommendations of the pipe manufacturer.

C. All other nuts and bolts shall be low carbon steel in conformance with the chemical and mechanical requirements of ASTM A307, Grade B. Higher strength bolts will be acceptable.

2.03 PIPE HANGERS AND SUPPORTS

A. Pipe hangers and supports shall be as specified in Section 15010.

2.04 COATINGS AND LININGS OF PROCESS AND PRESSURE PIPE

A. Coatings and linings where required shall conform to the following requirements unless otherwise indicated in Part 4 of this Section or on the Drawings.

B. Ductile Iron Pipe:

1. Ductile iron pipe, and fittings unless otherwise specified, shall be lined on the interior with a standard thickness cement lining meeting ANSI A21.4 and AWWA C104. A seal coat of bituminous material shall be applied in conformance with the above Specifications. Piping used for compressed air shall not receive a cement lining.

2. All pipe used within buildings and structures and which are to receive field coats of paint shall not be coated with any black bituminous paint. Such pipe, after proper cleaning, shall be painted with one coat of primer paint that is compatible with the field coats. Painting specifications shall be followed for cleaning and painting.

C. Steel Pipe:

1. Steel pipe shall be shop lined on the inside with centrifugally spun cement mortar lining or field applied-in-place cement lining, in accordance with AWWA C205 and C602. If pipe is field lined, it shall be given an inside shop coat of bituminous primer after sandblasting before shipment to the Site.

2. The outside of all buried steel pipe shall receive a coat of an approved bituminous primer, followed by a coat of coal tar enamel into which shall be bonded a single layer of felt wrap, and finished with a single wrap of craft paper unless otherwise specified. All materials and application procedures to be in full accordance with the pertinent sections of AWWA C203. Protective coatings are to be shop applied.

3. The outside of steel pipe inside of buildings and structures, and exposed exterior shall be properly cleaned and shop painted with one coat of primer that is compatible with field coats.

2.05 PIPE ESCUTCHEONS

A. Split-type escutcheons shall be used for piping passing through finished wall, floors, or ceiling. Escutcheons shall be brass plated or chromium plated Model 3A by Ritter, Model 284 by Fee & Mason, or equal.

2.06 WALL PIPE AND SLEEVES

A. Type A Wall Pipe:

1. Cast iron wall pipe shall be used where noted on the Drawings.
2. Wall pipe shall be cast in place with joints as indicated on the Drawings.
3. Where wall pipe is flush with wall, bolt holes shall be tapped for studs.

B. Type B Sleeve:

1. Type B sleeves are for use in exterior walls.
2. Type B sleeves consist of casting in place a cast iron sleeve two sizes larger than the service pipe with couplings on both ends of the sleeve.
3. Service pipe shall be caulked in place with oakum. The oakum shall be covered with a minimum of 1-inch of lead wool on both ends.

C. Type C Sleeve:

1. Type C sleeves are used in exterior walls and other walls as designated on the Drawings.
2. Type C shall be a modular mechanical type seal of interlocking synthetic rubber links.
3. Unless otherwise indicated, the seal shall be suitable for corrosive service in a temperature range of minus 40 degrees F to 250 degrees F. The pressure plates shall be of delrin plastic for good resistance to organic compounds. The bolts and nuts shall be of 18-8 stainless steel. The sealing elements shall be of EPDM rubber which has high resistance to most organic and inorganic materials.

D. Type D Floor Sleeve:

1. Type D sleeves are used for pipes passing through floors.
2. Type D sleeves consist of casting in place a Schedule 40 steel sleeve with four anchors in the floor slab. The sleeve shall be one size larger than the service pipe or 1-inch larger than the flange on the service pipe. The sleeve shall extend 1-inch above the finish floor surface.

E. Type E Sleeve:

1. Type E wall sleeves shall be used where noted on the Drawings.
2. Type E sleeves consist of casting in place a mechanical joint, cast iron wall sleeves meeting the requirements of AWWA C110 and C111.
3. Each Type E sleeve shall be sealed using plain rubber gaskets, follower glands, and mechanical joint studs meeting the requirements of AWWA C111 on both ends.

F. Type F Sleeve:

1. Type F sleeves shall be used for passing through existing masonry walls.
2. Type F sleeves shall be constructed as detailed on the Drawings using 15-pound felt paper and sealant.

G. Type G Sleeve:

1. Type G sleeves used for passing through gastight floors shall be similar to Type C sleeves with the addition of non-shrink grout as shown on the Drawings.

H. Type H Sleeve:

1. Type H sleeves shall be similar to Type G sleeves and used for passing through gastight walls.
2. Type H sleeves shall be as detailed on the Drawings.

I. All wall pipes and sleeves shall be coated or lined in accordance with the appropriate materials for its service.

2.07 EXPANSION JOINTS

A. Expansion joints as specified below shall be installed as per Section 15010.

B. Expansion joint construction shall include a neoprene inner tube extending through the bore to the outside edge of both flanges. The inner tube shall be covered with a flexible multiple layer fabric carcass of high strength rubber impregnated synthetic fibers with steel wire or reinforcement rings integral with the fabric to assure sufficient rigidity for vacuum service and high pressure. An outer cover coated with Hypalon paint shall cover the carcass and provide full protection against ozone and weathering.

C. Flange faces shall be neoprene covered and drilled to match drilling in mating flanges. Flange faces shall also be backed by split steel flange retaining rings.

D. All expansion joints shall be suitable for service temperatures of 225 degrees F.

E. All expansion joints used for vacuum service shall be capable of withstanding a 30-inch Hg vacuum.

F. Expansion joints shall have recommended working pressures compatible with the service for which they are installed.

G. All expansion joints shall be equipped with control units to restrict excess axial compression and elongation. Control units shall consist of plates bolted to pipe flanges

on each end of the expansion joint and long control bolts extending between pipe flanges.

H. Expansion joints on pipes used for digester gas service shall be the open arch type.

I. Expansion joints on sludge piping shall be of filled arch construction to prevent solids accumulation at the joint.

J. Expansion joints on pipes used for fuel oil and digester gas service shall have Buna-N tubes.

K. For those locations where expansion joints are used to replace valves, spool pieces, or other short sections, standard single arch expansion joints may be of insufficient length. At these locations double, triple, and quad arch expansion joints shall be used as required.

L. Expansion joints shall be Mercer Rubber Company Style 500-700 or equal.

PART 3 EXECUTION

3.01 PRODUCT HANDLING

A. Care shall be taken in handling and transporting to avoid damaging pipes and their coatings. Loading and unloading shall be accomplished with the pipe under control at all times and under no circumstances shall the pipe be dropped. Pipe shall be securely wedged and restrained during transportation and supported on blocks when stored in the shop or field.

B. Store all pipe on a flat surface so as to support the barrel evenly. It is not recommended that pipe be stacked higher than 4-feet. Plastic pipe, if stored outside, shall be covered with an opaque material to protect it from the sun's rays.

3.02 PIPE INSTALLATION

A. General:

1. All pipe shall be laid to lines and grades in conformance with Section 01800.

2. Wherever piping passes through walls or floors, a wall casting pipe or sleeve of the type indicated on the Drawings shall be installed. Escutcheons shall be provided for pipe passing through finished walls, floors, or ceilings.

3. Pipe Anchoring:

a. Approved joint restraints shall be installed for the distance from each side of each bend, valve, plug, tee, or wye in locations shown or scheduled on the Drawings.

B. Connections to Existing Pipes

1. Unless otherwise specified, shown on the Drawings, or directed, connections to existing sewers shall be made in conformance with the jointing materials

manufacturer's recommendations and as directed by the Resident Project Representative.

2. Where new piping is to be connected into an existing joint, said joint shall be cleaned sufficiently to result in a liquid- or gastight seal. If applicable, a new gasket shall be supplied and installed.

C. Process and Pressure Pipe:

1. Pipe and appurtenances shall be installed true to line, grade, and location; with joints centered, spigots home; pipe properly supported and restrained against movement; and all valve stems plumb.

2. All elbows, tees, plugs, etc., shall be properly anchored, blocked, or otherwise restrained to prevent movement of the pipe in the joints due to internal or external pressure.

3. The open ends of all pipes and special castings shall be plugged or otherwise closed with a watertight plug to the approval of the Resident Project Representative before leaving the Work for the night, and at other times of interruption of the Work. All pipe ends which are to be permanently closed shall be plugged or capped and restrained against internal pressure.

4. Where new or existing pipe requires cutting in the field it shall be done in a manner to leave a smooth end at right angles to the pipe centerline. The finished cut must be approved by the Resident Project Representative.

5. Joints:

a. Gaskets - Just prior to joining the pipes, the surfaces of the joint rings shall be wiped clean and the joint rings and rubber gaskets shall be liberally lubricated with an approved type of vegetable oil soap. The spigot end, with the gasket placed in the groove, shall be entered into the bell of the pipe already laid, making sure that both pipes are properly aligned. Before the joint is fully "home," the position of the gasket in the joint shall be determined by means of a suitable feeler gauge supplied by the pipe manufacturer. If the gasket is found not to be in proper position, the pipes shall be separated and the damaged gasket replaced. The pipe is then forced "home" firmly and fully. In its final position, the joint between the pipes shall not be deflected more than 1/2-inch at any point.

b. Concrete Pressure Pipe Diapers - A band at least 5-1/2-inch wide shall be placed around the outside of concrete pressure pipe, over each joint as recommended by and available from the pipe manufacturer. This band shall serve as a form for placing a 1:2 cement mortar grout in the external recess formed by the face of the bell and the shoulder of the spigot. If the air temperature is below 40 degrees the spigot, bell, and mortar shall be heated. If a reinforced paper joint band is used, it shall be drawn up tight around the pipe and backfill tamped against it up to

the springline before pouring the grout. If a cloth band is used, it shall be wired around the outside of the pipe and the grout poured before backfilling.

c. Concrete Pressure Pipe Interior Joints - The interior joint recess of pipe 24-inch and larger shall be pointed using a non-shrinking mortar specified in Subsection 2.01. The inside surface shall be struck off smooth with the pipe interior. On pipe 20-inch and smaller a rope type mastic or trowellable mastic shall be affixed to the concrete face of the bell socket just prior to pushing the spigot into the bell, such that the mastic material squeezes to fill the internal joint recess. Mastics that are detrimental to rubber gaskets shall not be used. Similarly, primers to be used in conjunction with rope type mastics must be kept off gaskets and sealing surfaces of joint rings.

d. Bell and Spigot Lead Joints - If used, the spigot of each pipe shall be fully seated in the bell of the adjoining pipe, adjusted to form a uniform annular space which shall be caulked with sterilized pre-molded rubber, forming a solid packing against which molten lead shall be poured and caulked. Lead, after caulking, shall have a depth of at least 2-inch for pipes 14-inch or less in diameter, and 2-1/2-inch for larger pipe. The melting pot shall be kept near the joint which shall be made by one pouring. Dross shall not be allowed to accumulate in the pot. All Work shall be performed by skilled workmen.

e. Electrical Continuity - Where specified, electrical continuity shall be provided in concrete and steel pressure pipes by welding an insulated #4RR copper cable across joints. The cable shall be welded to the steel of bell and spigot of concrete pressure pipe and across joints including each piece of coupling on jointed steel pipes.

3.03 SLEEVES AND WALL PIPE

A. Type A wall pipes shall be provided for all pipes passing through the exterior walls unless other sleeve types or wall pipes are designated on the Drawings. Type C sleeves shall be provided in interior walls unless designated otherwise on the Drawings.

B. At all points where piping passes through floors, Type D sleeves shall be provided, unless otherwise designated on the Drawings.

C. Other sleeve types and wall pipe shall be provided as indicated on the Drawings.

D. All wall pipes and sleeves shall be coated or lined in accordance with the appropriate materials for its service.

3.04 PRESSURE AND LEAKAGE TESTS FOR PROCESS AND PRESSURE PIPE

A. The Contractor shall furnish the pump, pipe connections, taps, gauges, auxiliary water container, bulkheads, plugs, and other necessary equipment and make pressure and

leakage tests of all lines including the joint between existing and new pipes unless otherwise directed by the Engineer.

B. Tests shall be conducted on all pipelines or valved sections thereof as directed by the Resident Project Representative. Testing of pipelines laid in excavation or bedded in concrete shall be done prior to backfilling or placing concrete cover, except restrained sections of pipe which shall be backfilling prior to testing, unless otherwise permitted by the Engineer. Tests on lines anchored or blocked by concrete shall not be conducted until the concrete has taken permanent set.

C. The line or section thereof to be tested shall be filled slowly with water to expel all air. Hydrostatic pressure shall be applied by pumping water from an auxiliary supply. The test pressure shall be maintained two hours minimum and additional time as required for thorough inspection to find any leaks or defects in the force main and appurtenances. Unless indicated otherwise in Part 4, the test pressure shall be 100 pounds per square inch or 50% above the normal operating pressure, whichever is greater. Should the pipe section fail to pass the tests, the Contractor shall find and correct failures and repeat the tests until satisfactory results are obtained.

D. Leakage tests shall be made simultaneously with or following completion of pressure tests of all lines or valved sections thereof. Leakage is defined as the quantity of water added to the pipe under test to maintain the required test pressure for a specified time. The leakage test pressure shall be not less than the maximum operating pressure of the section under test. The duration of the leakage test shall be not less than two hours. Allowable leakage for buried piping shall not exceed 9 gallons per inch of pipe diameter per mile of pipe in 24 hours. For piping not buried, any leakage during the test is unacceptable.

3.05 RESERVED

3.06 INSTRUMENTATION CONNECTIONS

A. The Contractor shall make all necessary allowances for and install all controls and instrumentation furnished under any Contract Division and which require in-line connection to process and pressure piping.

B. The Contractor shall provide all necessary mounting bosses, pipe and boss taps, plugs, tees, and any miscellaneous appurtenances to allow connection of Instrumentation and Controls and their associated piping to process and pressure piping.

C. Thermowells complete with all appurtenances listed in Division 16 shall be furnished and installed under that Division. Thermowells complete with all appurtenances which are not included in the list in Division 16 and are to be installed in piping under this Section, shall be furnished and installed under this Section.

D. Instrumentation and Controls are furnished and specified under various Sections including Section 16902. Any schedules shown in Section 16902 are not guaranteed to be complete.

PART 4 SPECIAL PROVISIONS

4.01 PIPING SCHEDULE

A. The following letter designations are used in the Piping Schedule:

Material Designation:

DIP - Ductile Iron Pipe
VCP - Vitrified Clay Pipe
PVC - Polyvinyl Chloride
PPVC - Perforated Polyvinyl Chloride
FRP - Fiberglass
Steel - Steel
SWS - Spiral Welded Steel
CPP - Concrete Pressure Pipe
RCP - Reinforced Concrete Pipe
CPT - Corrugated Polyethylene Tubing

B. Schedule:

Service	Size	Material	Remarks
Raw Wastewater	4-inch through 8-inch, flanged	DIP, Class 350	Valve Structure & Wet Well Piping

C. Schedules are not guaranteed to be complete. All piping shown on the Drawings or specified shall be furnished and installed by the Contractor whether or not listed in the above schedule.

D. See Section 02555 for buried pipe.

4.02 PIPE LAYOUTS

A. The final pipe layouts shall be prepared based upon piping measurements, field confirmed by the Contractor and submitted for approval by the Engineer in the form of a shop drawing.

4.03 LEAKAGE TESTING

A. The leakage testing requirements of this section are waived. A visual inspection of the piping placed into service shall be performed to test the pipe for leakage.

END OF SECTION

SECTION 15211
SMALL PIPING AND VALVES

PART 1 GENERAL

1.01 SCOPE

A. This Section includes furnishing and installing all pipelines and valves less than 4-inch in diameter as shown on the Drawings or as required for a complete piping system for each service or combination of services except the piping and valves included in Section 15400 and Section 15500.

B. Each piping system shall be adequate to conduct and control the flow of process water, plant water, non-potable water, instrument air, compressed air, vacuum, natural gas, sewage gas, propane, fuel oil, chemicals, sewage, sludge, sampling or other uses as specified or shown on the Drawings.

C. This Section includes, but is not limited to:

1. Securing and bearing the cost of all permits, certificates, and inspection as required by local regulations and state codes.
2. All pipe, fittings, and connections for water supply to equipment and waste to drains.
3. Valves less than 4-inch in diameter, control devices, pipe hangers, anchors, supports, and sleeves for the piping systems covered under this Section.
4. Hose bibbs, sill cocks, and hydrants.
5. Non-potable water supply, drain lines, and connections to boilers, pump priming systems, pump gland seals, valve operating cylinders, or other equipment requiring these services.
6. Compressed air piping, valves, connections to valve operators, and other equipment requiring compressed air.
7. Compressed air, non-potable water, natural gas, propane, vacuum, deionized water, and other services as required for laboratory service.

D. The Contractor shall remove all existing pipelines and valves less than 4-inch in diameter that are indicated on the Drawings to be removed except piping and valves included in Section 15400 and Section 15500. Removals shall be done in accordance with the requirements of Section 02110.

E. The Contractor shall relocate existing piping and valves less than 4-inch in diameter, except piping and valves included in Section 15400 and Section 15500, which interfere with Work under this Section or any Section of the Specifications.

F. The Contractor shall furnish, install, and remove all temporary piping and valves that are required to maintain processes in operation during construction.

G. All wall, floor, and roof penetration and any building modifications which are required for the installation of the Work under this Section shall be included in this Section.

H. Instruments which are to be located in pipelines to be furnished under Division 16 shall be installed under this Section.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

   a. Drawings shall include plan dimensions to and elevations of sleeves, inserts, and anchors, the size and location of each run of pipe, and the location of valves and unions.

   b. Manufacturer's literature, catalog data, specifications, and illustrations shall be bound in a brochure which includes a complete bill of materials.

2. Information for the Record:

   a. Operation and maintenance manual.

PART 2 PRODUCTS

2.01 PIPING MATERIALS

A. Stainless Steel Pipe:

1. Stainless steel pipe less than 4-inch in diameter shall be designed and fabricated in accordance with ASTM A312. The interior surface of the pipe shall be smooth with no protrusions, stiffeners, or bracing. The pipe and fittings shall be constructed of 304L stainless steel, or as specified on the Drawings.

2. Stainless steel pipe shall be minimum Schedule 40S, unless otherwise noted on the Drawings.

3. Fittings shall conform to ASTM A403 and shall have the same wall thickness and structural properties as the pipe. All bends shall be long radius smooth type. Mitered bends will not be acceptable.

4. Flanges where required shall be ASTM A182-F304L flanges with full facing gaskets and centering rings. Flange bolts shall be stainless steel.

5. Wherever possible, butt weld fittings shall be used for field welding. All welds shall be made by a certified welder and shall conform to procedures for which the welder has been certified. The Contractor shall submit certification statements for the welders and the methods employed. Belled end fittings may be used in lieu of butt weld fittings on air lines.

6. All welds shall have full penetration and be smooth and without protrusions on the interior of the pipe. Weld metal shall be equal to or greater than the parent

metal. Any cracks or blow holes appearing on the surface of a welding bead shall be ground away before depositing the next bead.

7. All stainless-steel surfaces shall be passivated by the following procedures:

   a. All outside weld areas shall be wire brushed to remove weld splatter. Brushes shall be stainless steel and used only on stainless steel.

   b. All stainless-steel assemblies and parts shall be completely immersed in a pickling solution of 6% nitric acid and 3% hydrofluoric acid at 140 degrees F for a minimum of 15 minutes. Parts shall be free of iron particles or other foreign material after this procedure.

   c. Previously pickled parts shall be neutralized by immersion in a trisodium phosphate rinse.

B. PVC Pipe and fittings shall be composed of Class 12454-B rigid PVC compound in conformance with ASTM D1784 (formerly classified Type I, Grade 1). Pipe shall be Schedule 80 with a design stress of 2000 psi in conformance with ASTM D1785. All joints, unless otherwise shown on the Drawings, shall be solvent welded in conformance with ASTM D2855. Joint solvent shall be as recommended by the pipe manufacturer and shall comply with ASTM D2564. In pressure or vacuum lines and in gravity drains 1-inch diameter and less, the fittings shall be Schedule 80 and shall conform to ASTM D2467. For gravity drains greater than 1-inch diameter, the fittings shall conform to the requirements of ASTM D2665. PVC pipe shall be used for acid-resistant services and all lines carrying chlorine solution, sodium hypochlorite, De-ionized (DI) water and other chemicals unless otherwise shown on the Drawings or specified.

C. CPVC Pipe shall be composed of Class CPVC 23447-B plastic as defined in ASTM D1784 (formerly classified Type IV, Grade 1). Pipe shall be Schedule 80 chlorinated polyvinyl chloride pipe in accordance with ASTM F441. Fittings shall be schedule 80 and shall conform to ASTM F439. All joints, unless otherwise shown on the Drawings, shall be solvent welded in conformance with ASTM D2896. Joint solvent shall be as recommended by pipe manufacturer and shall comply with ASTM F493. CPVC pipe shall be used where designated in Part 4 or on the Drawings.

2.02 VALVES

A. Unless otherwise specified or shown on drawings, valves installed in pipelines 3-1/2-inch diameter and smaller for process water lines shall be gate valves; for compressed air and vacuum, globe valves; for natural and sewage gas lines, lubricated plug or eccentric nonlubricated plug valves; and for gas lines less than 2-inch diameter tapered nonlubricated plug cocks; for fuel oil, ball valves; for sludge, eccentric nonlubricated plug valves. Valves for other types of services when required will be specified under that Section.

B. Gate Valves shall be 150-pound, all bronze, rising stem, solid wedge disc furnished with screwed or flanged ends as required. Gate valves shall be Crane No. 431, Jenkins No. 47-U, Powell No. 514/515, or equal.

C. Quick Opening Gate Valves shall be used at locations as shown on the Drawings. Quick opening gate valve shall be Crane 432 or equal.

D. Globe Valves shall be 150-pound, all bronze body with renewable plug-type disc of 500 Brinell Hardness Stainless Steel. The seat ring shall be screwed-in and of the same material as the disc. Globe valves shall be Powell No. 2600, Crane No. 14-1/2P, Jenkins No. 2032, or equal.

E. Ball Valves through 2-inch shall be screwed end bronze, two-piece, 125 psi, Teflon seats, bronze trim, and blowout-proof stem, Nibco No. T-580-BR-Y-20, or equal.

F. Butterfly Valves shall be AWWA, Class 150 B, wafer body equipped for ANSI 125-pound flanges. Butterfly valves shall provide bubble-tight shutoff to 150 psig cold water pressure. The valve body shall be made from ASTM A126, Grade B cast iron or equal. The valve disc shall be made with nickel-coated cast iron, bronze, or equal. Valve shall have bronze shaft bearings, O-ring shaft seals, and EPDM valve body seat Keystone Figure 239, or equal. Valves shall be hand lever actuated.

G. Check Valves shall be 200-pound, all bronze body with bronze disc, Y-pattern, with flanged or screwed ends as required. The check valves shall be Crane No. 36, Powell 560-Y/561-Y, Jenkins 762-A, or equal. Non-slam check valves shall be used on all pipelines operating at 25 psig or higher pressure and shall be Valve and Primer Corporation, Series 300 or equal.

H. Nonlubricated Plug Valves shall be 150-pound, all bronze body and plug, with synthetic rubber faced plugs and have screwed or flanged ends as required. They shall be DeZurik Figure 120, or equal. Valves shall operate with nonremovable lever type handles.

I. Lubricated Plug valves 3-1/2-inch and smaller shall be 150-pound solid bronze body and plug, lever operated, furnished with screwed or flanged ends as required, and with nonremovable lever operating handles. Lubricated plug valves shall be Rockwell Permaturn Figure 114, or equal. Each valve shall be equipped with a giant button head coupler for use with a hydraulic hand lubrication gun. One gun shall be furnished.

J. Plug Cocks shall be nonlubricated tapered plug type cocks, furnished with a square operating nut and wrench. Plug cocks 1-inch diameter and smaller shall be all bronze; larger sizes shall be furnished with bronze plug and washer and iron body. Plug cocks shall be designed for 125 pound working pressure, Walworth 554, Hays 1275, or equal.

K. Sampling Cocks shall be Ernest Gage Co. Fig. 29, Conbeaco, or equal.

L. Pressure Regulator shall be Watts U5HP, or equal.

M. Corporation Stops shall be brass and comply with AWWA C800 as manufactured by Ford Meter Box Co., Inc. or equal. Corporation stops shall be provided with inserts, saddles, and curb boxes as required. Saddles shall be brass with double straps and be placed over a molded rubber gasket.

2.03 RESERVED

2.04 RESERVED

2.05 RESERVED

2.06 RESERVED

2.07 RESERVED

2.08 RESERVED

2.09 RESERVED

2.10 RESERVED

2.11 SLEEVES

A. Type B Sleeve:

1. Type B sleeves are for use in exterior walls.
2. Type B sleeves consist of casting in place a black wrought iron sleeve two sizes larger than the service pipe with couplings on both ends of the sleeve.
3. Service pipe shall be caulked in place with oakum. The oakum shall be covered with a minimum of 1-inch of lead wool on both ends.

B. Type C Sleeve:

1. Type C sleeves are used in exterior walls and other walls as designated on the Drawings.
2. Type C shall be a modular mechanical type seal of interlocking synthetic rubber links by Link-Seal, or equal.
3. Unless otherwise indicated, the seal shall be suitable for corrosive service in a temperature range of minus 40 degrees F to 250 degrees F. The pressure plates shall be of Delrin plastic for good resistance to organic compounds. The bolts and nuts shall be of 18-8 stainless steel. The sealing elements shall be of EPDM rubber which has high resistance to most organic and inorganic materials.

C. Type D Floor Sleeve - Type D sleeves consist of casting in place a steel sleeve with four anchors in the floor slab. The sleeve shall be one size larger than the service pipe or 1-inch larger than the flange on the service pipe. The sleeve shall extend 1-inch above the finish floor surface.

D. Type E Sleeve:

1. Type E wall sleeves shall be used where noted on the Drawings.
2. Type E sleeves consist of casting in place mechanical joint, cast iron wall sleeves meeting the requirements of AWWA C110 and C111.
3. Each Type E sleeve shall be sealed using plain rubber gaskets, follower glands, and mechanical joint studs meeting all requirements of AWWA C111 on both ends.

E. Type F Sleeve:

1. Type F sleeves shall be used for passing through masonry walls, except as otherwise noted on the Drawings.
2. Type F sleeves shall be constructed as detailed on the Drawings using 15-pound. felt paper and sealant.

F. Type G Sleeve - Type G sleeves used for passing through gastight floors shall be similar to Type C sleeves with the addition of non-shrinking grout as shown on the Drawings.

2.12 PIPE ESCUTCHEONS

A. Split-type escutcheons shall be used for piping through finished walls, floors, or ceilings. Escutcheons shall be of brass or chromium plated Model 3A by Ritter or equal.

2.13 RESERVED

2.14 RESERVED

PART 3 EXECUTION

3.01 INSTALLATION

A. Cutting of all pipe shall be done with sharp tools. The ends of each pipe shall be reamed until all burrs or fins are removed. Full tapered threads shall be used throughout and threaded joints shall turn up perfectly tight without the use of filling substances. A standard pipe joint paste or tape suitable to use of pipe shall be used on the male threads only, and none shall be allowed to accumulate on the inside of the pipes. All connections between pipe, pipe hangers, and equipment shall be made with an approved dielectric insulating material. Dielectric unions or insulated couplings shall be installed between any dissimilar metallic piping materials or at connections between dissimilar metallic pipes and equipment, tanks, etc.

B. Pipe joints shall conform to respective industry standards.

C. Expansion and contraction of the piping system shall be provided for by the use of swing joints, right angle loops, or approved expansion joints. Branch connections shall have three elbow spring pieces to allow for movement. Unless specified in Part 4, the piping system shall provide for the expansion as required in Section 15010. An expansion joint is also required at all building isolation or expansion joints.

D. Interior and exterior pipelines shall be installed and graded in accordance with State and/or Local Codes. Interior pipes shall run at right angles or parallel to building walls, placed as close as practicable to the ceiling and/or walls, and supported according to Section 15010. Drain valves shall be installed at all low points.

E. Pipe groups shall be run parallel with pipes of other trades, and wherever practicable, all piping shall be supported on common group hangers unless pitch of pipe as hereinbefore mentioned is required.

F. The piping shall be installed in a workmanlike manner and shall avoid interference with columns, beams, equipment, and other piping or fixed construction. A minimum of 7-feet of headroom shall be maintained at any point including stairs.

G. Type C wall sleeves shall be provided for all pipes passing through exterior walls unless other sleeve types are noted on the Drawings. Type C sleeves shall also be provided in interior walls where indicated on the Drawings, Type D floor sleeves shall be used where piping passes through floor. Other sleeve types shall be used where shown on the Drawings.

H. Buried pipe shall be firmly bedded the full length with the exception where bell holes are required. Buried piping located less than 3-feet below a building slab or footing shall be encased in concrete. Where unstable soil conditions occur under buildings, support shall be made from the underside of the structural slab by an approved type hanging device embedded in the concrete.

I. Unless shown otherwise on the Drawings, all buried pipe carrying liquids shall be installed with a minimum cover of 42-inch. Pressure piping which carries gases shall be installed with a minimum cover of 3-feet. When new piping crosses existing utilities and other obstructions which force a change in elevation or horizontal alignment, the Contractor shall install the new piping at a deeper elevation or new alignment to avoid the obstructions unless otherwise instructed by the Engineer. Such changes in elevation or alignment shall be made either by installing fittings or by deflecting joints in accordance with the pipe manufacturer's recommendations. Such Work shall be performed at no additional cost to the Owner. To the extent possible, pressure and process piping shall be installed at a constant grade. All changes in grade shall be approved by the Engineer.

J. Where PVC piping is laid in a trench, the bottom of the trench shall be well graded and compacted to insure even bearing for the full length of the pipe and the pipe shall be snaked at approximate 50-foot intervals to provide for expansion or contraction. Prior to testing the pipe, the pipe shall be center loaded with backfill between joints before testing to prevent the pipe from arching or whipping under pressure. During backfill the line shall be pressurized to 25 psi to minimize impact damage.

K. All valves shall be installed with their stems horizontal or above. As far as possible, all valves of the same type shall be of the same manufacturer.

L. Solenoid operated valves shall be installed in horizontal lines with the solenoid mounted vertically and upright.

M. The T-drill method manufacturing tees in continuous copper tubing is not acceptable.

3.02 EQUIPMENT CONNECTIONS

A. The Contractor shall make all connections where required between the various piping systems and all pieces of equipment. This shall include adapters, traps, backwater valves, or other fittings required when not furnished with the equipment.

B. Unions - Provide a union or flange in piping connections to each valve, device, or item of equipment, and elsewhere as required to makeup or disconnect piping. Each union shall be so installed as to permit the removal of parts and equipment for inspection and cleaning, and shall be installed in a position which will permit the valve device or part to be removed without disconnection of any piping except unions. Union and flange shall be installed in such a position as will be accessible for disconnection items which are to be screwed. All ground joint unions on copper lines shall be cast brass or bronze. Wrought copper unions are not to be used. All unions, where possible, shall be brass to MPT type.

3.03 INSTRUMENTATION CONNECTIONS

A. The Contractor shall make all necessary allowances for and install all controls and instrumentation furnished under any Contract Division and which require in-line connection to process and pressure piping.

B. The Contractor shall provide all necessary mounting bosses, pipe and boss taps, plugs, tees, and any miscellaneous appurtenances to allow connection of Instrumentation and Controls and their associated piping to process and pressure piping.

C. Thermowells complete with all appurtenances listed in Division 16 shall be furnished and installed under that Division. Thermowells complete with all appurtenances which are not included in the list in Division 16 and are to be installed in piping under this Section, shall be furnished and installed under this Section.

D. Instrumentation and Controls are furnished and specified under various Sections including Section 16902. Any schedules shown in Section 16902 are not guaranteed to be complete.

3.04 RESERVED

3.05 RESERVED

3.06 RESERVED

3.07 RESERVED

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

SECTION 15250
VALVES

PART 1 GENERAL

1.01 SCOPE

A. This Section includes the furnishing and installing valves, flap gates, and shear gates 4-inch and larger.

B. Floor stands, floor boxes; valve boxes; gears, manual, hydraulic, and electric operators; extension stems; stem guides and supports; brackets; gaskets; bolts and nuts; and other accessories shall be provided as necessary to complete the Work.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

   a. The Contractor shall indicate all variances from the requirements of the Contract Documents.

   b. Scaled dimensional drawings.

   c. Wiring schematics with termination point identification.

   d. Piping schematics.

   e. Materials of construction.

   f. Manufacturer's catalog data.

   g. General Arrangement Drawings.

   h. Motor information per Section 11050.

2. Information for the Record:

   a. Operation and maintenance manual.

PART 2 PRODUCTS

2.01 GENERAL

A. All valves and appurtenances shall be of standard make approved by the Engineer and shall have the name, monogram, or initials of the manufacturer cast thereon. They shall be built and equipped for the type of operation shown on the Drawings, specified herein, or as directed by the Engineer.

B. Opening Direction - Unless otherwise specified in Part 4, valves with screw stems shall open by turning counterclockwise, the direction being indicated by an arrow cast where easily visible to operator.

C. Connections - Valves shall be provided with hubs, spigots, flanges, mechanical groove-type, screw, or other connections compatible with the pipe in which they are installed or scheduled in Part 4.

D. Unless otherwise specified, a stuffing box packed with O-ring seals shall be used to seal the stem of the valve. The seal system used shall be replaceable without removing bonnet or rotating element. Gaskets shall be of either Buna or a rubber composition.

E. Bolts and nuts on buried valves shall be a low alloy steel cathodic to the valve body and having a minimum yield strength of 45,000 psi. All other nuts and bolts shall be low carbon steel conforming with the mechanical and chemical requirements of ASTM A307, Grade B.

2.02 RESERVED

2.03 CHECK VALVES

A. Check valves, unless otherwise noted, shall be standard swing type, quiet closing, and constructed for 150-pounds working pressure. They shall be iron body, bronze mounted, with outside lever and adjustable weights, flanged connections, and have hinge pins of hardened corrosion-resistant alloy. Discs on sizes smaller than 6-inch shall be solid bronze, and on larger sizes shall be cast iron with bronze facing.

B. Applicable specifications under gate valves, as to materials and character of construction, shall apply to check valves.

2.04 RESERVED

2.05 PLUG VALVES

A. Unless otherwise shown on the Drawings or called for in the Valve Schedule, plug valves shall be the nonlubricated eccentric type valve providing dead tight shut-off.

B. Port area of valves shall be not less than 100% of the nominal pipe area.

C. The valve body bonnet and rotating element shall be semi-steel (ASTM A126, Class B). The bonnet shall be held in position with bolts and designed with a recessed tongue and groove or dowel pinned connection to the valve body to insure proper alignment of the body and bonnet bushings.

D. Corrosion-resistant bushings of the permanently lubricated type shall be provided in the body and the bonnet to support the rotating element trunnions. Bushings shall be stainless steel, bronze, or metal-jacketed fusion-bonded Nylon 11 suitable for sewage service. Valves 24-inch and larger shall have bronze bearings and stainless-steel sleeves. Tape, sprayed, or roll-on type bushings or sleeves are not acceptable.

E. The valve body seat contacting the rotating element shall be welded in overlay of not less than 90% pure nickel or fusion-bonded Nylon 11 coating. The seating surface of the rotating element shall be Hycar, Buna-N, neoprene or other material recommended by the manufacturer for the application specified.

F. Valves and actuators shall have seals on all shafts and gaskets on covers to prevent leakage of liquid out of or the entry of dirt or liquid into the valve.

G. For buried or submerged service, actuator and mounting bracket shall be completely enclosed to prevent entry of dirt or liquid.

H. Manual gear actuators shall be rated for bi-directional shutoff at the valves design pressure rating.

I. Grit seals are required on both the upper and lower plug shafts.

2.06 RESERVED

2.07 RESERVED

2.08 RESERVED

2.09 RESERVED

2.10 RESERVED

2.11 RESERVED

2.12 RESERVED

2.13 RESERVED

2.14 VALVE BOXES

A. All buried valves shall be provided with valve boxes. Valve boxes shall be standard, three-piece screw type, cast iron adjustable boxes, with tops of boxes set flush to finished grade. Valve boxes shall not be less than 5-inch in diameter and shall have a minimum thickness at any point of 3/16-inch. The cover shall have cast thereon an appropriate name for the kind of service for which the valve is used.

B. A valve box shall be provided for each curb stop. A key shall be furnished to operate curb stops.

C. All parts of valve boxes, bases, and covers shall be coated by dipping in bituminous varnish.

D. Extension stems shall be provided for buried valves when the operating nut is 3-feet or more below finished grade. Extension stem shall extend operating nut to within 16-inches of the ground surface, shall be provided with spacers which will center the stem in the valve box, and shall be equipped with 2-inch square wrench nut. Extension stems shall meet the requirements of this Section.

2.15 RESERVED

2.16 RESERVED

2.17 RESERVED

2.18 MANUAL OPERATION

A. Valves shall be equipped with nut, hand wheel crank, chain, gears, floor stand, and other appurtenances as required for manual operation as specified or scheduled. Operators shall be in accordance with AWWA specifications except as modified herein.

B. Each valve with a manual operator within a building which is more than 5-feet-6-inch above the floor to the rim of the manual operator shall have a chain wheel with galvanized chain looping 3-feet-6-inch from the floor. The valve shall be oriented to permit chain wheel operation or intermediate pulleys shall be installed to facilitate chain operation.

C. Operation shall be designed so that the effort required to operate the hand wheel, lever, or chain shall not exceed 25 pounds applied at the extremity of the wheel or lever. The hand wheels on valves 4-inch and larger shall not be less than 12-inch in diameter.

D. Gears for valve operation shall be installed in such a manner that the stuffing box will be accessible for packing.

2.19 RESERVED

2.20 RESERVED

2.21 SHOP PAINTING

A. All iron parts shall be painted before leaving the shop.

B. Unless otherwise specified, all internal ferrous surfaces of each valve except finished or bearing surfaces shall be shop painted with two coats of an asphalt varnish.

C. Unless otherwise specified, all exterior ferrous surfaces of each valve except finished or bearing surfaces shall be shop painted with two coats of a universally compatible primer or in the case of valves buried or submerged, with two coats of an asphalt varnish.

2.22 SOURCE QUALITY CONTROL

A. Each check, gate, butterfly, and ball valve shall be submitted to operation and hydrostatic tests at the manufacturer's plant as specified in applicable AWWA Standards.

B. Other valves shall be tested in conformance with applicable specifications in Part 4 of this Section.

2.23 AIR RELEASE – COMBINATION AIR/VACUUM RELEASE VALVES

A. Contractor shall furnish and install Combination Air/Vacuum Release Valve for sewage application as shown on the Drawings.

B. Contractor shall provide structures as specified in section 02552 and shown on the drawings.

C. Sewage Combination Air/Vacuum Release valves shall consist of the following functions:

1. Exhaust accumulated air from the force main taking into consideration the design flow rate of the force main.

2. Allow air to enter the force main thereby preventing a vacuum condition in the force main.

3. Prevent surges or sudden pressure rise (anti-surge) in the force main due to closure of the valve. The anti-surge shall operate automatically and Limit transient pressure rise of shock induced by closure to less than two times the valve working pressure.

4. Provide continuous valve operation by allowing accumulated air in force main to escape during force main operation.

5. Each air/vacuum release valve shall be furnished with an isolation valve to the force main. The isolation valve shall be a ball valve through 2 inches. The ball valve shall be screwed end stainless steel, two piece, Teflon seats, and blowout-proof stem, Nibco No. T-580-S6-R-66-LL, or equal. Isolation valves 3 inches and larger shall be gate valves meeting the requirements or this section.

D. Sewage combination air/vacuum release valves shall be constructed of the following:

1. Body of valve shall be stainless steel. Cover and top of the air valve are made of reinforced nylon or stainless-steel SAE 316.

2. All internal metal parts shall be stainless steel. Floats shall be made of polypropylene or polycarbonate.

3. Valve shall be designed to prevent any contact between wastewater and the sealing mechanism by the creation of an air gap at the top of the valve. The air gap shall be maintained even under extreme conditions.

4. The lower body shall be designed to ensure that residue wastewater matter will drain to the pipe, to be carried away by the flow, and does not remain in the valve.
5. The sealing mechanism shall not be sensitive to pressure changes.
6. A spring supported joint between the stem and the upper float shall be provided so vibration of the lower float do not unseal the air release orifice of the air valve. Air release shall occur only after enough air accumulates.
7. The internal workings shall be able to be removed through the top cover of the valve without removing the valve from the force main.
8. Valve shall be A.R.I., D – 020 2-inch threaded or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. All valves shall be carefully installed in their respective positions free from distortion and stress. Connecting joints shall conform to applicable requirements of Section 15210.

B. Stem guides shall be accurately aligned.

C. Double disc gate valves shall not be installed with the bonnet more than 90 degrees from an upright position.

D. Accessories:

1. Valve Boxes shall be installed in a plumb position and in alignment with the operating nut.
2. Extensions stems and stem guides shall be in alignment with operating nut and prevent binding and stresses on connecting pins.
3. When there is a change to the grade elevation, valve boxes new and existing shall be adjusted to the new grade elevation.

3.02 RESERVED

3.03 TESTING

A. All valves shall be tested in place by the Contractor as far as practicable under the conditions for the pipelines in which they are placed, and defects revealed in valves or connections under test shall be corrected at the expense of the Contractor to the satisfaction of the Project Field Representative.

PART 4 SPECIAL PROVISIONS

4.01 VALVE SCHEDULE

A. The following letter designations are used in the Valve Schedule:

Type Designation
CV - Check Valve
GV - Gate Valve
PV - Plug Valve
BV - Butterfly Valve
3PV - 3-Way Plug Valve
MV - Mud Valve
PR - Pressure Relief Valve
FG - Flap Gate
SG - Shear Gate
A – Air Valve

Connection Designation
F - Flanged
W - Wafer
MJ - Mechanical Joint
PE - Plain End
T - Threaded

Operator Designation
FB -Floor Box
TW - Tee Wrench
G - Gear
HW - Handwheel
C - Chain
M - Motor
L - Lever
VB - Valve Box
FS - Floor Stand
N – Operating Nut

Use Designation
RW - Raw Wastewater
DW - Dilution Water
WAS - Waste Activated Sludge
RAS - Return Activated Sludge
WW - Washwater
PW - Plant Water
CW - City Water
SW - Scrubber Water
GS - Ground Sludge
GW - Groundwater
SE - Secondary Effluent
F - Filtrate
ML - Mixed Liquor

Service Designation
O-C - Open-Close
M - Modulation

Location Designation
FT - Final Settling Tank
MH - Manhole
TF - Tertiary Filters

B. The Schedule is as follows for the Franklin Street Pump Station:

Valve Number	Size (in.)	Type	Connection	Operator	Use	Service	Location
PV-1	8	PV	F	HW	RW	O-C	Valve Chamber
PV-2	8	PV	F	HW	RW	O-C	Valve Chamber
PV-3	8	PV	MJ	N	RW	O-C	Buried, see Plans
PV-4	8	PV	MJ	N	RW	O-C	Buried, see Plans
CV-1	8	CV	F	L	RW	O-C	Valve Chamber
CV-2	8	CV	F	L	RW	O-C	Valve Chamber
ARV	2	A	T	N/A	RW	O-C	Valve Chamber

C. Schedules are not guaranteed to be complete. All valves shown on the Drawings or specified shall be furnished and installed by the Contractor whether or not listed in the above schedule.

END OF SECTION

SECTION 15400
PLUMBING

PART 1 GENERAL

1.01 SCOPE

A. This Section includes furnishing and installing all necessary plumbing components, connecting piping, and accessories, and a complete plumbing system for each service or combination of services.

B. Each system shall be adequate to conduct and control the flow of hot and cold potable water, sanitary lines, vents, roof drains, or other uses as specified or shown on the Drawings.

C. Plumbing is defined to include all potable water and all building sanitary drainage and vents and all building storm drainage of every size located in all buildings and up to a point, 5-feet -0-inch outside each building.

D. Work includes, but is not limited to:

1. Securing and bearing the cost of all permits, certificates, and inspection as required by local regulations and state plumbing codes.
2. All pipe, fittings, and connections to sanitary fixtures for potable water supply and waste, including vents, roof drains, floor drains, equipment drains, traps, cleanouts, and backwater valves.
3. Pressure gauges, thermometers, control devices, pipe hangers, anchors, supports, hose bibbs, sill cocks, and sleeves.
4. Potable water supply to boiler makeup water stop valves, or other equipment requiring these services.
5. Pipe insulation complete with jacket as required by Section 15504.
6. Sanitary fixtures, sinks, lavatories, backflow preventer valves, water coolers, acid neutralizing basins, oil and grease separators, and water heaters.

E. Additional product requirements are specified in Section 01350.

F. All equipment, materials, and Work shall comply with Federal, State, and local plumbing codes. Equipment materials and Work specifically required by Federal, State, or local plumbing codes whether or not shown on the Drawings or specified shall be provided by the Contractor at no change in Contract Price.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:
   a. Manufacturer's literature.
2. Information for the Record:
   a. Material certificates.
   b. Licenses and permits.
   c. Operation and maintenance manual.

1.03 CONTRACT DRAWINGS

A. All Drawings are diagrammatic and are intended to show the approximate location of equipment and piping.

B. The exact location of apparatus, fixtures, equipment, and piping shall be ascertained by the Contractor in the field, and the Work shall be laid out accordingly. Should the Contractor fail to ascertain such locations, the Work shall be changed at his own expense when so ordered by the Engineer. The Engineer reserves the right to make minor changes in the location of piping and equipment up to the time of installation without additional cost to Owner.

1.04 PROTECTION FROM DAMAGE

A. Delivery, Handling, and Storage:
   1. Material delivery, handling, and storage shall meet the requirements of Section 01350.
   2. All valves, toilet fixtures, and appurtenances shall be crated before shipment.
   3. All plastic fixtures and pipe, if stored outside, shall be covered with an opaque material to protect them from the sun's rays.

B. After Installation:
   1. Suitable covers and guardrails shall be placed to protect against chipping enamel or denting the surfaces of any equipment after it is installed and during the final days of construction.
   2. Before acceptance, all covers and protective material shall be removed and the fixtures and equipment cleaned and ready for use.

PART 2 PRODUCTS

2.01 RESERVED

2.02 VALVES

A. Ball valves through 2-inch shall be screwed end bronze, two-piece, 125 psi, Teflon seats, bronze trim, and blowout-proof stem, Nibco T-580-BR-Y-20 or equal.

2.03 RESERVED

2.04 RESERVED

2.05 RESERVED

2.06 RESERVED

2.07 RESERVED

2.08 PRESSURE AND SUCTION GAUGES

A. Pressure gauges shall be 4-1/2-inch in size with fiberglass reinforced polypropylene case, phosphor bronze bourdon tube, 6-inch or 4-1/2-inch dial faces with black lettering, micrometer type pointers and an accuracy of plus 1% of scale range. Pressure gauge shall be H.O. Trerice No. 450 series, Ashcroft 2462 series, or equal.

B. Gauges shall read in feet with graduations as listed below.

1. Franklin Street Pump Station: 0 – 200 feet.
2. Industrial Drive Pump Station Discharge: 0 – 50-feet.
3. Industrial Drive Pump Station Suction: 0 – 25-feet.

C. All pressure gauges unless otherwise directed shall include a brass pressure snubber and a needle type shut-off valve.

D. For sanitary sewer applications, pressure gauges shall have diaphragm seals. The gauges, seals, and snubber shall be factory assembled and filled with fluid. The diaphragm seal shall be Type 316 stainless steel with a stainless-steel housing. Diaphragm seal shall be an Ashcroft 101 series, H.O. Trerice 877-2 series, or equal.

2.09 RESERVED

2.10 RESERVED

2.11 RESERVED

2.12 RESERVED

2.13 RESERVED

2.14 RESERVED

2.15 RESERVED

2.16 RESERVED

2.17 RESERVED

2.18 RESERVED

2.19 RESERVED

PART 3 EXECUTION

3.01 INSTALLATION

A. Cutting of all pipe shall be done with sharp tools. The ends of each pipe shall be reamed until all burrs or fins are removed. Full tapered threads shall be used throughout and threaded joints shall turn up perfectly tight without the use of filling substances. A standard pipe joint paste shall be used on the male threads only, and none shall be allowed to accumulate on the inside of the pipes. All connections between pipe, pipe hangers, and equipment shall be made with an approved dielectric insulating material.

B. Pipe joints shall conform to respective industry standards.

C. Expansion and contraction of the piping system shall be provided for by the use of swing joints, right angle loops, or approved expansion joints.

D. Interior and exterior pipelines shall be installed and graded in accordance with State and/or Local Plumbing Codes. Interior pipes shall run at right angles or parallel to building walls, placed as close as practicable to the ceiling and/or walls, and supported by hangers or brackets. All hangers and inserts or other approved method of pipe supports shall be provided. The inserts or anchor bolts shall be located according to Drawings and Specifications and installed in the concrete at the time it is placed.

E. Drain valves shall be installed at all low points. Vent valves shall be installed at all high points.

F. Pipe groups for plumbing shall be run parallel with pipes of other trades, and wherever practicable, all piping shall be supported on common group hangers unless pitch of pipe as hereinbefore mentioned is required.

G. The piping shall be installed in a workmanlike manner and shall avoid interference with columns, beams, equipment, and other piping or fixed construction. A minimum of 7-feet of headroom shall be maintained at any point including stairs.

H. Type C wall sleeves shall be provided for all pipes passing through exterior walls unless other sleeve types are noted on the Drawings. Type C sleeves shall also be provided in interior walls where indicated on the Drawings, Type D floor sleeves shall be used where

piping passes through floor. Other sleeve types shall be used where shown on the Drawings.

I. Provide a system of vents from each plumbing fixture and drain, extended to drain at the bottom, and through the roof, providing equalized pressure on every trap. As a minimum the system shall be as indicated on the Drawings, but in no case, shall the complete system be less than required by the State and local Plumbing Codes.

J. Sanitary waste and vent piping indicated may, in some instances, exceed the code requirements. If Drawings indicate individual wastes for each fixture, then the Drawings and Specifications shall hold precedence over the code even though it exceeds the prescribed waste and vent code minimum.

K. Each vent stack shall be carried through the roof whether in combination with its parallel soil stack or in multiple combination with other vent stacks. Each vent or stack shall be increased one pipe size before passing through roof, but in no case, shall a vent through the roof be less than 4-inch

L. All vents through the roof less than 18-inch from an outside wall shall be offset by means of 1/4 bends to permit proper flashing.

M. Stacks enclosed in wall chases in finished rooms shall have extension pieces placed in tees set to bring the cleanout plugs just back of the finished wall line, and finished at the wall line with chromium plated cleanouts, Zurn No. 1440-1, Josam, or equal.

N. Buried pipe shall be firmly bedded the full length with the exception where bell holes are required. Unless shown otherwise on the Drawings, all pipelines shall be installed with a minimum cover of 5-feet. Where unstable soil conditions occur under buildings, support shall be made from the underside of the structural slab by an approved type hanging device embedded in the concrete.

O. Unless shown otherwise on the Drawings, all buried pipe carrying liquids shall be installed with a minimum cover of 5-feet. Pressure piping which carries gases shall be installed with a minimum cover of 4-feet. When new piping crosses existing utilities and other obstructions which force a change in elevation, the Contractor shall install the new piping at a deeper elevation to avoid the obstructions unless otherwise instructed by the Engineer. Such changes in elevation shall be made either by installing fittings or by deflecting joints in accordance with the pipe manufacturer's recommendations. Such Work shall be performed at no additional cost to the Owner. To the extent possible, pressure and process piping shall be installed at a constant grade. All changes in grade shall be approved by the Engineer.

P. Extend downspout laterals from each roof drain and riser to storm drainage system. Make direction changes with TY fittings or Y fittings and 1/8 bends as required. Install cleanouts at each direction change, and the base of each riser, and at 50-foot intervals in horizontal straight runs.

Q. Horizontal piping shall be suspended to a grade of not less than 1/8-inch per-feet wherever possible, and as close to construction as practicable to insure maintenance of schedule ceiling heights and avoid interferences. Direction changes, junctions, etc., shall

be made with TY fittings or Y fittings and 1/8 bends as required. Provide cleanouts at all directions, changes, dead ends, and at 50-foot intervals on straight runs.

R. Install cleanout fittings at the base of each vertical pipe used for sanitary drains, roof conductors, or vent stacks, and at each change of direction of the building drain greater than 45 degrees F.

S. The ends of all horizontal drain lines shall be extended to cleanouts as specified above with top of plug set level with the finished floor.

T. Underground traps, except “P” traps, into which floor drains with removable strainers discharge, shall be provided with accessible and removable cleanouts.

U. Where PVC piping is laid in a trench, the bottom of the trench shall be well graded and compacted to insure even bearing for the full length of the pipe and the pipe shall be snaked at approximate 50-foot intervals to provide for expansion or contraction. Prior to testing the pipe, the pipe shall be center loaded with backfill between joints before testing to prevent the pipe from arching or whipping under pressure. During backfill the line shall be pressurized to 25 psi to minimize impact damage.

V. All valves shall be installed with their stems horizontal or above. As far as possible, all valves of the same type shall be of the same manufacturer.

W. The T-drill method of manufacturing tees in continuous copper tubing is not acceptable.

X. Polypropylene pipe installation for laboratory use shall be in accordance with Contract Drawings, the manufacture’s recommendations, and the local plumbing code. Entire system shall be installed free of stress and in proper alignment without strain. Horizontal supports shall be split ring or clevis type hanger spaced in accordance with manufacturer’s recommendations. Vertical supports shall be standard riser clamps at each floor. Piping components shall be fused electronically with a Chem-Fuse power unit. Output voltage and fusion time shall be automatically controlled by the power unit. Connections between Chem-Fuse and other types of piping materials shall be made with Chem-Fuse adapters. Contractor shall provide, at no additional cost, on-site training for installation/maintenance personnel. Installation shall be in accordance with the manufacturer’s printed instructions, system design drawings, and applicable local codes. System testing shall be in accordance with local plumbing codes. Air or compressed gas is not recommended and should not be used as a media for testing Chem-Fuse piping systems.

3.02 RESERVED

3.03 RESERVED

3.04 RESERVED

3.05 TESTING AND ACCEPTANCE

A. Each pressure pipe system shall be tested hydrostatically at 150% of its operating pressure, unless otherwise stated in the Code. Test pressures and durations will be set by the Engineer and each test will be approved only after he has witnessed satisfactory pressures at the end of each test run.

B. The drains and vent lines shall be tested by filling the entire system with water to the highest point of overflow. After the pipes have stood full for 15 minutes, all joints and connections to fixtures shall be observed.

C. After all leaks have been repaired and approved, the lines and plumbing fixtures shall be flushed clean with hot water and left in a sanitary condition. The outside surfaces of pipes and equipment shall be cleaned of grease and dirt by a cleaning compound, then washed with water and allowed to dry.

D. The working temperature and pressure conditions shall be imposed on piping systems for a sufficient length of time to insure that flanges and bolts or studs have reached a point of constant temperature and have attained such changes in dimensions as will take place, after which all flanged joints and fittings on all equipment shall be retightened by the Contractor.

3.06 RESERVED

PART 4 SPECIAL PROVISIONS

None

END OF SECTION

SECTION 16005
ELECTRICAL

PART 1 GENERAL

1.01 SCOPE

A. This Section includes furnishing, planning, and coordinating all labor, equipment, materials, tools, plant supplies, testing, adjusting, and all temporary Work necessary to install all required electrical components and function for a complete electrical system(s) installation.

B. The Contractor shall provide all exposed, concealed, and underground electrical raceways, including conduits, wiring troughs, and auxiliary gutters, expansion and deflection fitting boxes, and all other fittings, supports, and other electrical raceway components required to complete the installation as shown and specified.

C. The Contractor shall provide related excavation, backfilling, concrete work, cutting and patching, and the restoration of all surfaces to their original condition.

D. The Contractor shall furnish all labor, materials, equipment, and incidentals required and install a complete grounding system in strict accordance with Article 250 of the National Electrical Code and as herein specified and shown on the Drawings.

E. Additional product requirements are specified in Section 01350.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. Where conduits are to be installed in a concrete slab, a conduit layout shall be submitted at least 14 days prior to the pour. All conduit layouts shall show conduits with anticipated number, size, and types of power, control or instrumentation, conductors/cables, spares, and grounds for each and every Section of Division 16 requiring separate conduits.

b. The Contractor shall submit detailed dimensional drawings covering all wiring systems and items of equipment. Drawings of co-jointly installed or operated equipment shall be submitted simultaneously for approval with Shop Drawings showing the assembly thereof. Drawings of equipment shall have the locations and service clearly noted. Shop Drawings, wiring and interconnection diagrams, where applicable, and manufacturer’s test reports shall be submitted.

c. Shop Drawings submitted for approval shall include complete wiring diagrams, showing control center wiring, including wiring between compartments, wiring to remotely located control stations, solenoids, limit switches, etc. Diagrams shall be supplemented by ladder-type

schematic diagrams in accordance with NFPA 79, Annex D standards. Where ladder-type schematic information is not available from the manufacturer, the Contractor shall submit written evidence of same from the manufacturer.

2. Information for the Record:

   a. Upon completion of the installation and acceptance by the Engineer, Record Documents of all electrical (schematic) diagrams, interconnection diagrams, panel layouts, instrument loop diagrams, and related support materials shall be corrected and amended, as required to reflect the installed system. This information shall be submitted in both of the following formats:

      1) Mylar plots of Drawings and photocopy of all other diagrams and literature.

      2) A computer file on CD of documents including but not limited to drawings in the latest version of AutoCAD format. Literature and other information shall be provided in either Microsoft Word or PDF format.

   b. Certificate of final inspection and approval from the inspection authorities and the Fire Marshall.

   c. Records of tests as required or as directed.

3. Operation and maintenance manuals, with information for the specific model number(s) used underlined, or conspicuously marked, to segregate that information from other model(s) where the manual includes information for more than one model.

1.03 QUALITY ASSURANCE

A. All Work shall be performed in accordance with the best modern practice and shall conform, as a minimum to the standards of the local authorities, the National Electrical Code, National Electric Safety Code, OSHA, and any other codes and standards specified or applicable. Where provisions of the cited codes or standards are modified or supplemented, the more stringent shall apply. The provisions or interpretation providing the highest standard work or quality of material shall prevail.

B. The Contract Drawings are diagrammatic, but shall be followed as closely as conditions at the Site of the Work will permit. They shall be supplemented by the Contractor with complete working drawings, including wiring diagrams, connection diagrams, conduit and equipment layouts to scale, and details of the installation, including conduit and ductbank penetrations through structural slabs and walls and other required information.

C. Wiring diagrams shown on the Contract Documents are suggestive only. Final control connections will depend upon the equipment selected. The Contractor may submit alternative diagrams for approval by the Engineer.

D. Electrical materials and equipment shall be designed and manufactured in compliance with the latest applicable Standards of the UL; IEEE; NEMA; ANSI; ASTM; the Insulated Cable Engineers Association; and other applicable standards. Materials commonly bearing UL labels shall be so labeled.

1.04 ELECTRICAL AND CONTROL COORDINATION

A. The locations of equipment, appliances, outlets, fixtures, and similar devices shown or specified shall be considered approximate. The exact locations shall be approved by the Engineer during construction, and as required to suit the ambient conditions at the time of installation. The Contractor shall obtain, in the field, all information of the actual Work and final locations under other sections required for the placing of his work, and shall consult the Engineer and ascertain the actual location required. The Contractor shall also consult with other trades and sections and examine their drawings so as to avoid conflicts with other Work and apparatus.

1.05 GUARANTEE

A. Provide completed warranty information for each item. Include the following information:

1. Date of beginning warranty period.
2. Duration of warranty.
3. Warranty options.
4. Name, address, phone numbers, and procedures for filing warranty claims.

PART 2 PRODUCTS

2.01 GENERAL

A. All equipment and materials shall be new and, if of the same kind or performing parts of the same system, shall be the products of the same manufacturer.

B. All equipment and material shall be furnished by a manufacturer whose products have been in satisfactory use in similar service for not less than 5 years.

C. Wherever materials, equipment, apparatus, or other products are specified by manufacturer, brand name, type, or catalog number, such designation is to establish standards of desired quality, style, and dimensions and shall be the basis of the Bid.

D. All control, instrument, monitoring, signal, or other such conductor installations, whether spare requirements are specifically mentioned or not, shall, as a minimum, include an additional unused 20% spare conductors over and above the number of conductors actually used or specified for this Contract, whichever is greater.

E. Control wires and shielded cable wires regardless of the location on this project shall have identification wire markers on each end of each wire and the wire numbers shall be identified on the submittal drawings. Complete electrical wiring diagrams identifying

all machinery, and equipment wiring as well as all component wiring shall be submitted before the project is accepted.

F. Electrical enclosure requirements shall conform with area classifications whether designated on the Drawings or not.

1. Unless shown otherwise on the Drawings, or specified, enclosures shall conform to the following: Enclosures, pushbutton stations, and components for enclosures located outdoors shall be NEMA 4X, and light switches and duplex outlets shall be weatherproof.

2. Areas with process equipment shall have minimum NEMA 4X enclosures and the installation shall conform to NEC Electrical Standards.

3. "Hazardous" areas with process equipment shall be a Class I, Division 1, Group D type classification for enclosures and the installation per (NEC) Electrical Standards unless marked differently on the drawings.

2.02 RESERVED

2.03 CONDUIT

A. Conduit shall be galvanized rigid steel, manufactured in accordance with UL 1242, and meeting the requirements of FS WWC-581, unless specified otherwise in the Project Specifications, or indicated on the Contract Drawings.

B. Conduit shall be hot-dip galvanized, including threads and couplings. Each length of conduit shall bear the UL label and the manufacturer's name and trademark.

C. No conduit smaller than 3/4-inch shall be incorporated in the Work, unless otherwise designated in the Project Specifications. Conduit installed underground or in poured concrete shall be 1-inch minimum size.

D. Plastic conduit (PVC) shall be heavy wall, Schedule 40 or Schedule 80, depending on installation, manufactured in compliance with NEMA TC-2 specifications and UL-651 Standards.

E. Underground plastic duct (PVC) shall be for concrete encasement or direct burial as specified and indicated. It shall conform to NEMA TC-6 and ASTM F512 Standards for underground installation. Concrete encasement shall be as recommended by the manufacturer. Plastic spacers, end bells, and fittings shall be furnished and installed, as required.

F. All Conduit in or connected to classified areas shall be rigid metal (RMC) type. All flexible metallic conduit shall be liquidtight unless otherwise indicated on the Contract Drawings or in the Project Specifications. Fittings shall be liquidtight and as recommended by the conduit manufacturer. Conduit shall be "Sealtite", or equal.

G. PVC Coated Conduit (where specified): A plastic coating shall completely encapsulate metallic conduit to provide total protection against corrosion. The zinc surfaces of the

conduit shall remain intact on both the inside and outside of the conduit throughout the preparation and application processing.

1. The conduit shall be “Hot Dipped” galvanized inside and outside including the threads. “Hot galvanizing” is not acceptable.
2. The threads shall be coated with urethane over the “Hot Dipped” galvanized threads.
3. A minimum thickness of 40 mils PVC exterior coating shall be permanently fused to a hot dipped galvanized rigid steel conduit.
4. A urethane or polyurethane interior coating shall be applied at a nominal 2 mil thickness to the interior of the conduit and over the hot dipped galvanized threads.
5. The PVC coating on all Form 8 fittings shall form a gasket-like flange of at least 5/16-inch wide and 0.040-inch thick covering the top of the fitting around the opening. All fittings should have a minimum of 40 mils PVC coating even around the edge of covers. Also, all fittings to have urethane coating inside and outside prior to PVC coating.
6. GUA type boxes shall be supplied with WOD type covers (Feraloy iron instead of aluminum) to prevent corrosive reaction between dissimilar metals. Conduit fittings (couplings, elbows, etc.) shall be of the same material.
7. PVC coated conduit shall be UL listed and conform to the same standards as a metallic conduit. PVC coated conduit shall be “OCAL BLUE” as manufactured by OCAL, Inc., “Permacote”, “Korcap” or “Plasti-Bond” as manufactured by Robroy Industries, or equal.
8. Conduit shall be supported by corrosion resistant straps and clamps.
9. Contractor shall follow manufacturer’s recommendations regarding the handling, bending, coupling, tools, and installation of the conduit specified herein.

2.04 CONDUIT FITTINGS

A. Conduit fittings shall be standard threaded type of cast ferrous alloy, to suit the location and purpose. Fittings shall be Crouse-Hinds, Appleton Electric, or equal.

B. Fittings for use with plastic conduit/duct, or PVC coated conduit, shall be compatible with the type of plastic conduit/duct, or PVC coated conduit used, and shall be of the same manufacturer.

C. Fittings shall be vapor proof, weatherproof, or explosion proof where required.

D. Unless specified otherwise, all exposed fittings, junction boxes, outlet boxes, terminal boxes, etc., shall be cast threaded hub type as specified. Also, all shall be hot-dip galvanized or cadmium plated.

E. Conduit expansion/deflection fittings shall be complete with bonding jumpers and shall be watertight.

F. Conduit insulating bushings with ground lug shall be the armored type.

G. Fire stops shall have a 3-hour fire resistance rating and shall be made by the 3M Company or equal.

2.05 BOXES

A. The volume of each outlet box shall be in compliance with the requirements of Article 314 of the NEC, minimum.

B. Outlet boxes located outside of buildings or in wet or damp locations shall be galvanized malleable or cast iron, or corrosion resistant stainless steel.

C. Pullbox size and gauge, unless otherwise indicated or specified, shall comply with Article 314 of the NEC, and be complete with covers. Pullboxes having any dimension greater than 8-inches shall be fabricated of not less than No. 12 gauge sheet steel, complete with cover and silicon-bronze screws, or equal. Boxes shall be constructed with all seams continuously welded, not spot welded. After fabrication, boxes shall be hot-dipped galvanized. Where additional pullboxes are required by code or to facilitate installation, they shall be furnished and installed at locations approved by the Engineer, at no additional cost to the Owner.

D. Boxes indicated as explosion proof shall be suited for connection to or exposure Class 1, Division 1 hazardous environments and sized s required per NEC. Barriers shall be provided to isolate intrinsically safe and non-intrinsically safe wiring.

2.06 WIRE AND CABLE

A. All wires and cables shall be delivered in full coils or reels and shall be properly tagged and well protected against damage by layers of paper and burlap wound around coils. UL “Approved Tags” giving grade of insulation, sizes and length of wire in each coil or reel, and the manufacturer’s name must be securely attached.

B. Unless specified otherwise, all conductors shall be soft drawn annealed copper wire of 98% conductivity, with THHN/THWN insulation for 600-volt service. All service, feeder, and motor circuit conductors larger than No. 4 AWG shall have 90 degrees C Type XHHW-2, crosslinked polyethylene insulation.

C. All fixture wire, including circuit extensions in fluorescent fixture channels, shall comply with NEC requirements.

D. All power wires shall be No. 12 AWG or larger. Control wires shall be No. 14 AWG or larger, unless specified otherwise. Signal wires shall be No. 16 AWG or larger, unless specified otherwise. All conductors shall be stranded copper.

E. Cable terminators shall be as required for the type of cable involved, O-Z/Gedney Electrical Manufacturing Co., Thomas and Betts Co., or equal, unless specified otherwise.

2.07 GROUNDING MATERIALS

A. Grounding materials shall be corrosion-resistant and chemically compatible with the materials with which they come in contact.

B. Ground rods shall be copper clad and not less than 3/4-inch in diameter and 10 feet long.

C. Connections in readily accessible locations shall be compression or bolted connectors of Burndy Engineering Company or equal.

D. Connections in locations not readily accessible after installation including splices and connections of grounding cable shall be made by exothermic welding by Cadweld or equal.

2.08 SPLICING MATERIALS

A. Dry Locations

1. No. 6 AWG and smaller wires

a. Insulated spring connectors (wire nuts)

b. Indentor butt connectors.

2. No. 4 AWG and larger wires

a. Splices to uncut main runs shall be made with “Crimpits”, or equal for No. 4 AWG thru No. 4/0 AWG.

b. Splices to uncut main runs shall be made with “Hytaps”, or equal for wires larger than No. 4/0 AWG.

B. Wet and Damp Locations

1. Indentor or compression connectors equal to “Sta-kon”, “Thomas and Betts”, or equal.

a. Splices to uncut main runs shall be made with “Crimpits”, or equal for No. 14 AWG thru No. 4/0 AWG.

b. Splices to uncut main runs shall be made with “Hytaps”, or equal for wires larger than No. 4/0 AWG.

2.09 CONCRETE

A. Concrete slabs for electrical equipment mounted on outdoor slabs shall be provided as shown. Unless otherwise indicated, slabs shall be 6 inches thick, project 2 inches above the highest-grade point, have No. 5 reinforcing bars 12 inches on center each way top and bottom, and set on 6 inches of No. 67 selected stone fill on top of compacted soil.

2.10 WIRING DEVICES

A. Switches shall be specification grade totally enclosed, quiet tumbler, AC type, meeting NEMA Performance Standards and FS and capable of control of 100% tungsten filament (incandescent) lamp loads.

B. Switches shall be rated at 20 amps, 120/277 volts. Operating handles shall be phenolic colored brown. Switches shall have screw terminals.

C. Receptacles shall be specification grade, meeting NEMA Performance Standards, and FS, and having a contact arrangement such that contact is made on two sides of each inserted blade without detent.

D. Receptacles shall be two-pole, three-wire grounding type with rating of 20 amps, 125 volts, NEMA configuration 5-20R, and have screw-type wire terminals suitable for No. 10 AWG designated CO/ALR. Bases shall be phenolic composition colored brown.

E. Receptacles for outdoor installation shall be provided with ground-fault protection with push-to-test capabilities.

2.11 IDENTIFICATION

A. Nameplates and Legends:

1. All new equipment shall be identified by means of a laminated phenolic nameplate.

2. Nameplate shall have white background with black engraved lettering or black background with engraved white lettering identifying function or equipment designation.

3. Main nameplate on MCC switchgear, control panel, etc. shall be 2 inches high by 6 inches wide with 1-inch high letters. Individual nameplates shall be 1-inch high by 3 inches wide with 1/4-inch high letters.

4. Legends shall be completely worded without abbreviations except as approved by the Engineer.

5. Nameplates shall be fastened by means of 3/16-inch diameter roundhead, stainless steel, self-tapping screws. All UL 508 4X enclosure nameplates shall be secured with silicon adhesive.

6. Blank nameplates shall be included on all unused components. Modified equipment shall be identified in the same manner as was the original equipment. Equipment whose designation has been changed shall be relabeled accordingly.

7. All nameplates on electrical panels which are fed from a remote source shall include, in addition to their function, where the power originates from (e.g. Scum Pump Panel - fed from MCC-1, MCC-1 fed from Main SWG).

B. All wires and cables, except at lighting and 120 volts convenience outlets, shall be identified by means of tags describing circuit. Tags shall be on all connections, splices,

and terminations, and shall also be applied where entering common wireway and at a minimum of 30 foot centers within the wireway. Wire tags shall be equal to Thomas & Betts Model WPR-125A white, self-adhesive wrap type labels. Tags shall be vinyl or polyester, resistant to heat, water, cold, dirt, and grease. The tag type-on area shall be sufficient size to contain five numerals on each line. Wire numbers shall be typed on with Thomas & Betts E-Z Coder Printer, WD-26P, or equal.

C. Pull, terminal, and junction boxes shall be identified by stenciling the names of the feeders and system wires and cables passing through them.

D. MCCs and power panels of NEMA 3R double-door construction shall have stenciled panel designation at the top and branch designations appropriately spaced in the outer doors. NEMA 4X lighting and power panels shall have designations appropriately placed on them.

E. Direct current conductors shall be identified by the following methods:

1. Provide self-sticking markers on each direct current conductor.
2. Marker colors shall be black letters on “alert orange” background.
3. Each marker shall designate circuit conductor polarity and voltage (e.g. +28 VDC).

PART 3 EXECUTION

3.01 COORDINATION

A. Coordinate electrical systems, equipment, and materials installations with other building components and building trades.

B. If the current requirement of any motor or piece of equipment is increased to such an extent that the wiring, conduit, or starter for that motor or equipment must be increased from that shown on the Electrical Drawings, the Contractor shall furnish and install the larger items at no additional cost to the Owner.

C. Certain equipment furnished under the equipment Sections shall be connected to a remote telemetry panel. Mechanical and electrical components for these connections shall be furnished, under the equipment sections, as required to provide control functions compatible with the plant control system. These connections and any remote-control connections shall be furnished and wired to clearly labeled terminal strips within the equipment control panel.

D. If the electrical control requirements change from that specified or shown on the Electrical drawings due to the requirements of the actual equipment furnished, the Contractor shall perform all necessary modifications under the equipment section and no additional compensation will be allowed. The final installation shall meet the operational intent of that specified and shown on the Drawings.

3.02 INSTALLATION

A. Contractor shall furnish and install all wires, cables, conduits, conduit fittings, and other accessories. Contractor shall drill all holes required for the installation. Parts shall be insulated effectively from the ductwork and building structure, and objectionable noise or vibration. The electrical materials, equipment, and apparatus shall be installed in such a manner that parts requiring inspection, adjustment, and maintenance shall be readily accessible.

B. Wiring shall be contained in metal, PVC, or fiberglass raceway, and at the completion of the job all boxes shall have closed covers and where brought into panels all shall be identified and bundled in a neat fashion.

3.03 OPENINGS AND SLEEVES

A. All electrical conduit penetrations through an exterior surface above grade level shall be sealed and made water tight. For metal panels, use a sealant around the conduit penetration on both sides of the wall.

B. All electrical conduit penetrations through the fire resistance rated walls or floors shall be fire stopped as required by the NEC using the approved method as recommended by the manufacturer.

3.04 CONCRETE

A. Contractor shall furnish and install all concrete and reinforcing steel necessary to complete the electrical work, including foundations and all materials for concrete and reinforcing steel work wherever required. All concrete shall conform to the requirements specified in Section 03300.

3.05 RESERVED

3.06 CONDUIT AND FITTINGS

A. Minimum size of conduit shall be 3/4-inch, except that concealed homeruns, underground, and embedded conduits shall be not less than 1-inch. Conduit shall be located for protection from mechanical damage. All conduit shall be sized in accordance with NEC.

B. Conduit in concrete slabs and underground shall be PVC conduit unless otherwise noted. Exposed conduit shall be galvanized rigid steel unless otherwise specifically called for. Conduit stub-ups between underground or slab construction and exposed or concealed wall construction shall be bends of rigid galvanized steel conduit, made in accordance with Section 344-10 of the NEC, and shall have an ample coating of asphaltic paint prior to the placement of concrete. Nonmetallic runs shall change to encased galvanized conduit approximately six diameters before becoming exposed.

C. Exposed rigid metallic conduit shall be installed parallel with or at right angles to the lines of the structure, except as otherwise shown, and supported in an approved manner. Conduit fastened directly to structures shall be held with one-hole, malleable iron clamps and clamp backs, or otherwise suitably spaced from concrete or masonry surfaces. Concealed rigid metallic conduit shall be installed in as direct a line as possible, and shall be rigidly supported by approved methods and materials.

D. PVC conduit shall be installed in true alignment and sloped 1/16-inches per foot minimum for drainage wherever possible. PVC conduits which terminate in the concrete walls of manholes, handholes, or other concrete walls shall be provided with manufactured end bells. The installation of non-metallic conduit shall conform to the requirements for metallic conduit.

E. Flexible connections to all equipment subject to movement or vibration shall be made by means of liquid tight flexible conduit equal in length to approximately ten times the diameter of the conduit but not exceeding 3 feet in length.

F. Bushing caps shall remain in place until immediately before the conductors are installed.

G. In areas designated as hazardous, all fittings, material, and equipment shall be of the type approved for such installation. Seal-off fittings shall be used as required by the NEC and local codes, and the complete installation shall be in accordance with the requirements of such codes. All components and Work shall conform to Class I, Division 1, Group D requirements.

H. All conduits to pumps or other equipment shall, unless otherwise shown on the Drawings, be routed through or below concrete floor slabs. Runs on floor slabs are not permitted unless specifically shown as such on the Contract Drawings. Conduit shall be concealed in all locations where walls are faced with glazed tile, or ceilings are suspended. In other areas, except in slabs, conduit shall be run exposed and as approved by the Engineer. Wherever conduit is concealed in masonry of any type, it shall be the responsibility of the Contractor to maintain a clear passageway throughout the entire conduit system, and to clean the conduit system before installing the conductors.

I. Where conduit bushings are constructed wholly of insulating material, a locknut shall be installed both inside and outside the enclosure to which the conduit is attached. Ungrounded conductors No. 4 AWG or larger shall be protected with insulated throat bushings where entering or leaving enclosure in conduit systems.

J. Pulling distances shall be limited to 125 feet, and suitable pull boxes, etc., shall be provided whether shown on the Drawings or not. All “tee” type and in-line conduit pulling fittings shall be with the tee-hub plugged, or pull boxes per Specifications. Conduit bends between pull points shall be a maximum of 3. Bends in conduit bearing cables for voltages greater than 600 VAC shall have a minimum radius of 36-inch.

3.07 UNDERGROUND CONDUIT

A. Underground conduit shall be concrete-encased where shown. The top of underground conduit shall be not less than 30-inches below grade unless otherwise specified. Concrete encasement shall provide a minimum cover of 6-inches on top and bottom and 6-inches on the sides. Horizontal curves where necessary, shall be drawn on radii of not less than six diameters of the largest conduit in the duct bank.

B. PVC conduit and fitting for use in underground duct banks shall be Schedule 40. Where direct-buried, it shall be Schedule 80.

C. Under pavement crossings shall have a 6-inches minimum concrete cover all around, be reinforced as detailed, and extend 5-feet either side of the pavement.

3.08 BOXES

A. Exterior and Exposed - Outlets in exterior locations and in exposed conduit shall be “FS” or “FD”, and PVC where used with PVC conduit.

B. Switches shall be mounted 50-inches above finished grade to the center of the box unless directed otherwise.

C. Special purpose outlets shall be located as shown on the Drawings, or in accordance with project or manufacturer’s requirements.

D. Splices made with wire nuts, crimp connectors, terminal blocks, split-bolts, or similar connectors shall be in boxes which are readily accessible.

3.09 WIRE AND CABLE

A. 120 and higher voltage wiring shall be in conduit. When installing wire or cable, extreme care shall be used to prevent any injury or damage to the materials. The Contractor shall observe the installation instructions and precautions issued by the manufacturer of the wire and cable. The Contractor shall avoid dragging cables across abrasive surfaces or obstructions in a manner which could damage the cable covering. Before pulling wires and cables, the Contractor shall file the record of conduit tests with the Engineer. No wires and cables shall be pulled until all operations which are likely to damage the conductors have been completed. Pulling compounds shall be submitted for approval prior to use, and shall be of such composition as not to damage the conductor covering. The Contractor shall provide adequate equipment for installation of cables which are satisfactory to the Engineer. Cables shall be pulled through conduits in such a manner as not to over stress, stretch, score, cut, twist, or damage the protective covering or insulation of the material. If mechanical means are employed for pulling the cables, a dynamometer shall be used.

B. Damp or Wet Locations - The ends of low-voltage cables installed in damp or wet locations shall be carefully sealed, as specified for deadends, until permanently connected or spliced. The Contractor shall be responsible for maintaining a dry condition while the cables are being pulled.

C. Support in Boxes and Enclosures - Wiring shall be done in a workmanlike manner and shall be furnished to give a neat and orderly appearance. Cables in boxes and equipment enclosures shall be neatly arranged, supported, and laced with approved materials. Cables shall be supported on cable racks in concrete pullboxes and manholes.

D. Pull Wires - Conduits left empty under this Contract shall be equipped with a polypropylene pull rope. Where conduits have less than 25% fill of required conductors/spares, they shall also have a suitable polypropylene line pulled-inch. The pulling line shall be cut and tied off to an anchored steel eyebolt at each box, cabinet, or other destination. Pulling lines may be omitted on lighting conduits less than 60 feet in length.

E. 120 volt “home runs” in excess of 100 feet shall be No. 10 AWG minimum. Branch circuits supplying 1500 watts or more at 115 volts shall be No. 10 AWG minimum.

F. Conductors in vertical runs shall be adequately supported with approved conductor supports, as outlined in the NEC.

G. Conductor Combination and Separation - The combining of conductors of various systems within one conduit system shall not be permitted. Conduit layouts shall provide for the cable separation requirements between various systems and between various signals within given systems throughout this Division as required by this Section. Each of the following shall be maintained in a separate conduit system apart from the others:

1. Lighting and 120-volt utility.
2. Power Distribution - Conductors for voltages over 600 VAC shall be in conduit separate from conduit containing power conductors for 600 VAC or less.
3. Motor Branch Circuit. Exception: Where conductors are less than No. 4 AWG, they may be combined with 7 below.
4. Communication Systems.
5. Alarm Systems.
6. Shielded Pair Instrumentation and Control.
7. 120-volt motor and equipment controls.
8. UL approved intrinsically safe instrumentation.

H. Separation distance requirements between each of the Items 1 through 8 above shall be as shown on the Drawings, or as otherwise required by the specifications. Shielded cables shall be placed in rigid galvanized conduit, and shall be spaced 12 inches minimum away from power and control conduits. Shielded cable conduits require no spacing between each other when being installed.

3.10 SPLICES AND TERMINATIONS: 600 VOLT AND BELOW

A. Splices and terminations in wires and cables rated 600 volts or less shall be made as described below. Indentor and compression type connectors shall be applied to conductors by means of a tool providing controlled indentation or compression. Splices

and connections shall have a conductivity and insulation resistance at least equal to that of the cable and shall be in strict accordance with the conductor manufacturer's recommendations.

1. Wherever conductors are terminated they shall be bundled and identified in a manner matching approved Contractor submitted drawings. Conductors shall be terminated wherever shown or implied on the Contract Drawings.

B. Splices - Wire and cable lengths shall be continuous and without splices between the points of connection, except as otherwise specified, indicated on the Drawings, or approved by the Engineer.

C. The Owner reserves the right to inspect any and all joints made in 600 volt wiring before they are taped, or if they are taped without being inspected, to order the tape removed from any joint(s), and the Contractor shall correct any defect found. After inspection and correction of any fault found, the Contractor shall properly re-tape the joints.

1. Dry Locations - No. 6 AWG and Smaller - Single-conductor, rubber or plastic-insulated conductors with nonmetallic coverings shall be spliced using the materials listed in Part 2 of this specification, followed by wrapping with two half-lapped layers of approved plastic tape extending a distance of not less than 1-inch from the connector.

   a. Insulated spring connectors.

   b. Indentor butt connectors.

2. Dry Locations - Conductors No. 4 AWG and Larger - Conductors shall be spliced using the materials listed in Part 2 of this specification, except as otherwise specified, by wrapping with two half-lapped layers of approved plastic tape extending a distance from the connector of twice the outside diameter of the larger conductor or 1 inch, whichever is greater.

3. The insulation of Conductors No. 2 AWG and larger shall be penciled to the diameter of the connector.

4. Where necessary to provide a smooth taping surface, approved electrical insulating putty shall be used as a filler before applying the tape.

5. Wet Locations or Locations Subject to Flooding or Hosing - Single-conductor, rubber or plastic-insulated conductors of all sizes with nonmetallic covering shall be spliced by the use of the connectors listed below, except as otherwise specified, by wrapping with four half-lapped layers of approved plastic tape, extending a distance from the connector of twice the outside diameter of the larger conductor, or 1 inch, whichever is greater. Splices in manholes shall only be permitted where specifically shown on Drawings. In manholes, splices No. 4 AWG and smaller shall be in submersible NEMA terminal boxes within easy reach of ground level.

3.11 GROUNDING

A. General:

1. System neutrals; secondaries of control power, instrument, metering and relaying transformers; noncurrent-carrying metallic equipment enclosures; exposed metal structures; and supports shall be effectively grounded to ground grids and busses provided under this Contract.

2. Noncurrent-carrying metallic parts, electrical equipment and systems including, but not limited to, transformers, motors, lighting, equipment, raceways, control panels and consoles, panelboards, and cable shields, as well as metallic structures, shall be grounded.

   a. Care shall be taken to ensure ground continuity, in particular between the conduit system and equipment frames and enclosures. Where necessary, jumper wires, sized per NEC Table 250-95, shall be installed.

   b. Conduits stubbed-up below a motor control center shall be fitted with insulated grounding bushings, and connected to the motor control center ground bus or structure. Boxes mounted below motor control centers shall be bonded to the motor control center ground bus. The grounding wire shall be sized in accordance with Table 250-95 of the National Electrical Code, except that a minimum No. 12 AWG copper shall be used.

   c. Liquid tight flexible metal conduit, UL approved for grounding, shall be permitted as equipment grounding means in the 1-1/4-inch and smaller trade sizes, if the total length in any ground return path is 6 feet or less, and the conduit is terminated in fittings approved for grounding.

      1) Flexible metal conduit, where permitted by NEC Article 348, is permitted as equipment grounding means if the above restrictions for the liquid tight flexible type are met, and if the circuits are limited to 20 amperes.

      2) Flexible metal and liquid tight metal conduit shall be bonded around externally on sizes 1-1/2-inch trade size and larger. Grounding liquid tight connectors or bronze grounding bushings shall be used for the installation of equipment grounding conductor around the flexible metal conduit.

   d. Insulated grounding bushings shall be used on the grounding of conduits 480 volts and higher, with the appropriate size copper equipment grounding conductor.

B. Conductors - Ground conductors shall be run with feeders in polyvinyl chloride conduits, whether shown or not, sized no less than required by NEC or larger if required by the Drawings.

C. Connections:

1. Exposed connections shall be made by means of approved grounding clamps. In readily accessible locations, compression or bolted connectors shall be used. Exposed connections between different metals shall be sealed with No-Oxide Paint Grade A, or equal. Buried connections shall be made by welding process.

2. Where grounding conductors are carried external to flexible conduit, they shall originate in bronze grounding clamps and terminate in a terminal bolted to the main frame of the motor (not to sheet metal terminal boxes).

3.12 IDENTIFICATION

A. The Contractor shall furnish and install equipment nameplates, typed panel rosters, wire and cable tags, stenciling, and other identification with text, lettering type, etc., as specified or as directed.

3.13 FIELD TESTING

A. General - Wherever testing is required, test shall be completed and accepted before the Contractor proceeds with subsequent Work. When adjustments are required following test procedure, test shall be repeated as many times as required to obtain test results acceptable to the Engineer or Permitting Authority. Written reports shall be required on tests.

B. The Contractor shall be responsible for the procurement and installation of compatible components and equipment, and shall perform Work necessary for the proper operation and guarantee of the equipment. The Contractor shall provide all labor, instruments, and apparatus required, and shall make such tests as may be necessary to demonstrate that the Work and equipment, as installed, complies with the Contract Documents.

C. Field testing shall be performed by the Contractor, as outlined herein, and as required to demonstrate that the installation meets the requirements of the Contract Documents. When required, such tests shall be performed in the Engineer's presence. Before conducting field tests, the Contractor shall submit to the Engineer, a written outline of the methods and equipment used. The Engineer reserves the right to require the Contractor's instruments be checked by an independent instrument tester. Test equipment shall be provided by the Contractor. Records shall be kept of each test, and copies shall be submitted to the Engineer.

D. Conduit - Cleaning and Clearance - After conduit and accessories have been installed, and all concreting operations completed, conduit runs shall be satisfactorily cleared of obstructions and foreign matter. Any defects which might damage cable upon installation shall be corrected.

1. Conduits shall be tested, in the presence of the Engineer, by pulling through each conduit a flexible cylindrical mandrel having an outside diameter 1/4-inch less than the inside diameter of the conduit, followed by a stiff wire brush of the same diameter as the conduit. Where conduits installed under this Contract are

connected to conduits installed by others, the entire runs between boxes, manholes, or other termination points shall be tested.

2. Record of Conduit Tests - The Contractor shall keep a record, by number, of conduits tested clear, and shall submit such record to the Engineer.

3. Any defects or stoppages in conduit runs installed by the Contractor shall be corrected at the Contractor's expense. Any defects or stoppages in conduit runs installed by others shall be reported to the Engineer, who shall determine the corrective measure to be taken.

E. Made Grounds - The Contractor shall test the ground resistance of the systems. Test equipment shall be provided under this Section and be approved by the Engineer. Dry season resistance of each system shall not exceed 5 ohms. If such resistance cannot be obtained with the system as shown, provide additional grounding as directed by the Engineer. Made grounds shall be tested by the Contractor, in the presence of the Engineer, for continuity and resistance; readings shall be recorded and submitted to the Engineer. Ground resistance of more than 5 ohms shall be reduced to 5 ohms or less by the use of additional ground rods or ground connections.

F. Low Voltage Systems:

1. Tests Before Equipment Connection - Upon the completion of each electrical system rated 600 volts or less, but before wiring connections are made to equipment, the Contractor shall test each circuit and each piece of equipment for:

a. Continuity.

b. Grounds.

c. Insulation resistance, phase-to-phase and phase-to-ground, of 480 volt conductors and equipment with a 500-volt megohmmeter. (See 3.13.F.2, below.)

2. Correction - If discontinuities or grounds are discovered in low voltage systems, they shall be corrected before the insulation resistance is measured. If any insulation resistance readings are lower than required, the Contractor shall repair or replace the equipment or wiring involved.

3. The Contractor shall perform insulation resistance testing of 480-volt power feeder circuits with a 500-volt megger, and prepare a written test report of the results. Equipment which may be damaged during this test, such as solid-state motor starters, variable-speed drives, etc., shall be disconnected. Tests shall be performed with all other equipment connected to the circuit. Insulation resistance readings, lower than that required by good practices or code, shall be promptly repaired or replaced. Retesting shall be considered complete when acceptable readings are acquired.

4. After control cable installation and conductor termination for instrumentation and control, the Contractor shall perform tests witnessed by the Engineer to

ensure that control cable shields are isolated from ground except at the grounding point. The Contractor shall remove all improper grounds at no additional cost to the Owner.

5. Following the satisfactory completion of the circuit and equipment insulation resistance tests and the connection of wiring to equipment, but before it is energized, the tests specified above shall again be carried out. The same care shall be taken to protect equipment as in 3.13. F. 3. above.

6. Motors shall be checked for proper rotation along with controls for proper function and corrected by contractor.

G. Acceptance Tests - Upon completion, and before the final estimate is submitted for payment, the entire installation shall be tested in the presence of the Engineer to see that the conditions of the specifications have been met. The entire system shall test free from shorts and unintentional grounds, and each part shall function properly, as intended. The entire system shall show an insulation resistance between conductors, and between conductors and ground not less than 3 megohm.

H. The Contractor shall measure and tabulate the line voltage of each phase at the load terminals of the main switch or circuit breaker in the building.

PART 4 SPECIAL PROVISIONS

4.01 SUPPORT MATERIAL SCHEDULE

A. Exterior – All exterior supports shall be 304 stainless steel.

B. In Wet Well Chamber or Exposed to Wastewater – All supports shall be 304 stainless steel.

4.02 SPARE PARTS

A. Spare fuses shall be provided and delivered to the Owner as follows:

1. Secondary (600 VAC or less) fuses shall be provided in the amount of 10% of each size and type installed, but in no case shall less than three spares of a specified size and type be supplied. Special control fuses, capacitor fuses, and electronic fuses shall be furnished exactly as provided by the equipment manufacturer with no substitutions permitted.

B. Primary (over 600 VAC) fuses shall be provided with one set of spare fuses for each set of primary fuse holders.

END OF SECTION

SECTION 16430
DISCONNECT SWITCHES

PART 1 GENERAL

1.01 SCOPE

A. This Section defines the requirements necessary to furnish and install circuit and motor disconnect switches in accordance with the Drawings and as specified herein.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

   a. Manufacturer's technical product sheets on each component to be furnished.

   b. Furnish manufacturer's name(s) and catalog numbers.

2. Information for the Record:

   a. Manufacturer’s recommended method of installation for the products to be furnished.

   b. Operation and maintenance manuals.

   c. Manufacturer's recommended spare parts list for the components and accessories.

   d. Provide warranty for review; executed copies shall be submitted when completed with copies included in the operation and maintenance manuals.

1.03 ELECTRICAL AND CONTROL COORDINATION

A. Layout and installation of disconnect switches and accessories shall be coordinated with other trades and with motor horsepower ratings.

1.04 PRODUCT HANDLING

A. Deliver disconnect switches properly packaged in factory fabricated type containers or wrappings, which properly protect devices from damage.

B. Store disconnect switches in original packaging and protect from weather and construction traffic. Wherever possible, store indoors. Where necessary to store outdoors, store above grade and enclose with watertight wrapping.

C. Handle disconnect switches carefully to prevent physical damage. Do not install damaged disconnect switches, remove from Site and replace damaged devices with new.

PART 2 PRODUCTS

2.01 FUSED SAFETY SWITCHES

A. Provide individual fused switches as specified, shown on the Drawings, or as directed.

B. Fused switches shall have a minimal short-circuit rating of 100,000 amps, RMS symmetrical.

C. Where shown on the drawings, provide switches that lock in the ON position. Field modifying to provide this feature shall not be permitted. Where the service disconnect is locked in the ON position, branch circuit overcurrent devices shall be located in a readily accessible location and shall be of a lower amp rating than the LOCKED-ON service overcurrent device per the NEC.

D. Disconnect switches located outdoors, in process areas, damp locations, wet locations, and indoors below grade shall be NEMA 4X stainless steel unless noted otherwise on the Drawings. Disconnect switches located indoors in dry, non-process areas above grade shall be NEMA 12 unless noted otherwise on the Drawings. Provide switches that can be locked in the OFF position. Enclosures shall be mechanically interlocked to prevent the opening of the cover with the switch in the ON position.

E. Fused switches shall be quick-make, quick-break, motor-rated, load-break, heavy duty (HD) type having external marking clearly indicating ON and OFF positions.

F. Provide fuses of the current ratings indicated and types specified in Section 16432 on fuses. Utilize rejection fuse clips that accept only Class RK1/RK5 fuses.

G. Disconnect switches for motors driving process equipment shall have two normally open auxiliary contacts. One shall be wired to disable the motor controller when the switch is open. The other shall be wired to signal the Plant Control System (PCS) that the equipment is "In Service." Disconnect switches for motors driving utility equipment shall have one normally open auxiliary contact. It shall be wired to disable the motor controller when the switch is open.

H. Switches shall be UL listed and horsepower rated for 250 VAC or DC or 600 VAC as required. Lugs shall be UL listed for copper cable. All fused switches shall include equipment grounding bar.

I. Where required by the NEC, fused safety switches shall be rated for use as service entrance equipment.

J. Disconnect switches shall be Square D, Crouse-Hinds, Cutler-Hammer, or equal.

2.02 NONFUSED SAFETY SWITCHES – SINGLE AND DOUBLE THROW

A. Provide non- fused switches with the same provisions as for fused switches but without fuse clips.

B. Disconnect switches for motors driving process equipment shall have two normally open auxiliary contacts. One shall be wired to disable the motor controller when the switch is open. The other shall be wired to signal the Plant Control System (PCS) that the equipment is "In Service." Disconnect switches for motors driving utility equipment shall have one normally open auxiliary contact. It shall be wired to disable the motor controller when the switch is open.

C. For applications in which all of the conditions listed in the following (1 thru 4) are met, the safety disconnect switch shall be a Crouse-Hinds NSSC manual motor starting switch, or equal, with a high-impact, fiberglass-reinforced polyester, corrosion-resistant, dust-tight, watertight, weatherproof enclosure rated NEMA 3, 4X, and 12 containing a two or three pole switch, as required by the application. Each switch shall have provisions to be pad locked in the off position. Each switch shall be UL listed and horsepower rated for 250 VDC or VAC, or 600 VAC as required. Lugs shall be UL listed for copper cable. Each switch shall include an equipment grounding plate for 3/4-inch and 1-inch conduit.

1. Auxiliary contacts are not required for interlocking or remote monitoring.
2. The driven equipment is not process related; e.g., overhead door operator, electric hoist, HVAC equipment, etc.
3. The motor is three-phase rated 10 hp or less at 460 VAC, 7-1/2 hp or less at 230 VAC, or single-phase rated at 2 hp or less at 230 VAC, or 1 hp or less at 115 VAC.
4. Motor overload protection is not required, or is provided separately by a separate device in the motor circuit.

D. Double throw switches shall have three operational positions: Source 1 On, Center Off, and Source 2 On.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install disconnect switches for use with motor driven equipment, motors, and controllers, within sight of the motor position where indicated.

B. Provide suitable means for mounting disconnect switches.

3.02 TESTING

A. Subsequent to completion of installation of electrical disconnect switches, energize circuitry and demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at Site, then retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

PART 4 SPECIAL PROVISIONS

4.01 FUSES

A. Provide and install fuses for all fused disconnect switches along with a minimum of 3 spare fuses of each size supplied.

END OF SECTION

SECTION 16902
METERING AND CONTROL EQUIPMENT

PART 1 GENERAL

1.01 SCOPE

A. Work under this Section includes furnishing and installing all metering and control equipment which is part of the Plant Control System except the programmable controller system and the graphic user interface system.

B. All Work performed shall comply and be in accordance with all approved trade practices and manufacturer's recommendations.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

   a. Manufacturer's literature including model number, type, size, materials, quantity, connections, equipment number, mounting hardware, and installation information.

2. Information for the Record:

   a. Equipment suppliers report that equipment is properly installed and satisfactory operation is obtained.

   b. Software, cables, etc. for configuration, programming or operation of meters or equipment, minimum of two each is required.

   c. Operation and maintenance manuals.

   d. Schedule of Owner's training for all new equipment.

PART 2 PRODUCTS

2.01 PRODUCT REQUIREMENTS

A. All metering and control equipment shall be as indicated on the Drawings and as specified, and shall include, but not be limited to those devices hereinafter defined. Should additional devices be required, but not specifically indicated elsewhere, in order to affect the intent of the Contract Documents, such devices shall be furnished.

B. All metering and control equipment used for similar applications shall be the product of a single manufacturer.

C. All features and requirements listed in the individual instrument specifications are required.

D. All field instrument enclosures shall be NEMA 4X construction except in hazardous locations where the enclosures shall be NEMA 7 for Class I, Division 1, Group D service, unless otherwise noted. Equipment in hazardous locations shall indicate temperature rating as specified in the NEC.

E. All faces of panel mounted instruments shall be NEMA 4X construction except where the panel is located in a protected Control Room environment.

F. Whenever an "or equal" equipment item is proposed in lieu of that specified it will not be considered equal if it is of non-potted construction and the specified item is potted construction.

2.02 PERFORMANCE REQUIREMENTS

A. Intrinsically safe equipment shall be Factory Mutual approved for Class I, Division 1, Group D service.

B. Analog signals for input to a programmable controller system shall be isolated 4-20 mA DC and where required, current to current transducers or other device shall be furnished to produce an isolated signal to the programmable controller analog input modules.

C. Digital input signal sources shall provide an isolated contact rated at 5-amp minimum, 115 VAC, to the programmable controller system.

D. Power supplies shall be furnished for two-wire transmitters and other devices requiring DC power. No more than four loops shall be powered from one power supply. Separate power supplies shall be provided for duplicate instruments to ensure failure of one power supply will not inhibit operation of secondary equipment.

E. The Site is in an area subject to radio frequency activity. Any equipment sensitive to radio frequency interference (RFI) shall be provided with the proper RFI filters, be properly shielded and grounded, or otherwise protected to allow proper operation of the equipment.

2.03 RESERVED

2.04 RESERVED

2.05 RESERVED

2.06 RESERVED

2.07 LEVEL

A. Level Switch ((LS))

Function:	High or low level shutdown of equipment.
Type:	NO/NC GRN Pear Shape Non-Mrcry KRPNM
Output Contacts:	SPDT, Non-inductive, 10 A at 120 VAC
Specific Gravity	0.6 - 1.5 g/cm^3
Process Temperature:	0 to 60 degrees C (32 to 140 degrees F)
Cable Length:	18 AWG, 41 strand, length as required by Installation Location
Materials:	PVC with adjustable neoprene strain relief and butyl cosmetic ring with cord weight
Manufacturer:	Conery
Model:	2902-B8S2C1-50

2.08 PRESSURE PIPE FLOW

A. Flow Element and Transmitter ((FE)/(FIT))

Function:	Measure flow in process line and transmit signal proportional to flow
Type:	Pulsed DC magnetic induction
Size:	As specified on Drawings and in Schedule
Input Signal:	Analog Process Flow
Conductivity:	Minimum 5 Micromho/cm
Process Temperature:	-10 to +130 degrees F
Outputs:	Isolated 4-20 mA DC INTO 1,000
	Flow direction, empty pipe detection, configurable status contact output
Display:	Backlight LCD capable of simultaneously displaying flow rate and totalization with sunshield
Calibration:	Provide with each flow meter a printout of three points of calibration starting at IFPS with measurement devices traceable to NIST standards.
Accuracy:	+/- 0.25 percent rate or less (3 to 33 fps)
Repeatability:	+/- 0.1 percent of reading
Range ability:	100:1 turndown
Selectable Damping:	0 to 99 seconds, configurable
Low Flow cutoff:	0 to 9 percent, configurable
Electrodes:	Hasteloy C Bullet Nose
Liner:	Polyurethane, hard rubber, or neoprene for sewage meters
Flow Tube:	
8 to 24 inches:	304 or 316 stainless steel, epoxy-coated, capable of direct burial and continuous submergence in 30 feet of water with cable to remote converter
End Connections:	150 lb. ANSI Flanges
Process Connection:	Carbon steel flanges
Grounding:	All meters must be supplied with orifice type 316 stainless steel grounding rings. Grounding electrodes are not acceptable.
Converter:	Microprocessor based remote converter. Refer to drawings for cable length.

Power Requirements:	110/120 VAC 50/60 Hz.
Transmitter Enclosure:	NEMA 4X/IP 65 remote electronic display, with flow rate and totalization indicator
Ambient Temperature:	-40 to 140 degrees F
Meter Electrical Reading	Class I, Division 2

2.09 RESERVED

2.10 RESERVED

2.11 RESERVED

2.12 RESERVED

2.13 ACCESSORIES

A. All piping and tubing for connections to instruments shall be stainless steel. Threaded pipe shall be ASTM A312, Grade TP304, Schedule 40S, and fittings shall be AISI Type 304. Tubing shall be ASTM Grade TP304, 0.028-inch minimum wall thickness for flareless "bite" type with threaded nut and ferrule fittings.

B. Diaphragm seals shall provide continuous isolation between pressure gauges, switches, and transmitters from process fluid. Upon instrument removal or failure, there shall be no leakage. Seals shall be of the type to allow instrument and diaphragm top housing to be removed from the process piping with no leakage of process fluid. Seal fill fluid shall be incompressible, non-corrosive, and suitable for materials of construction and temperature encountered, and shall be selected to minimize temperature effect. Sludge piping process connections shall be 1-1/2-inch, 150 pound flanged. Gas and water piping process connections shall be 3/4-inch NPT. All instrument piping connections shall be 1/2-inch or 1/4-inch NPT, as required. All process connections shall have a 1/4-inch NPT flushing connection with a 316 SS plug.

C. All mechanical fasteners such as bolts, nuts, screws, cinch anchors, clamps, etc., shall be stainless steel.

D. All special mounting brackets shall be stainless steel, galvanized, or nonferrous non-corrosive metal.

E. All equipment mounted outdoors that includes any type of visual indicator, LCD, etc., shall be furnished with a sun visor.

F. All equipment located outdoors shall include a thermostatically controlled space heater.

G. All field instruments and devices shall be equipped with a 1-inch x 3-inch stainless steel identification tag firmly affixed to the instrument or device with stainless steel fasteners. Each tag shall show the manufacturer's name, serial number, part number,

tag number (to be approved by the Engineer), calibrated ranges, or calibration constants.

H. For each type of device installed, the Contractor shall supply two complete sets of software, hardware, calibration devices, and cabling, used to configure, calibrate, or make adjustments.

PART 3 EXECUTION

3.01 GENERAL

A. The features and installation of the instrumentation shall be coordinated for optimal performance with the characteristics of the process material to be metered.

B. Care must be exercised to identify locations that meet the requirements of the manufacturer including upstream and downstream distances, pressures, temperatures, and accessibility for maintenance.

C. Verify equipment requirements and dimensions with provisions specified under this Section. Check actual field conditions, report necessary changes, and submit equipment reflecting changes.

D. Coordinate Work with other trades to avoid conflict and to provide correct rough-in and electrical connection requirements. Inform Contractors of other trades of the required access to and clearances around equipment to maintain serviceability and code compliance.

E. Where the installation of any device is dependent on, or affected by, Work performed under other sections of these specifications, the Contractor shall coordinate the Work. Installation coordination includes the correct location and placement of devices, piping to the equipment, pipe taps, control power circuits, connections to the control system, etc.

F. Installation of instrumentation in an existing system being modified, replaced, or abandoned, shall be coordinated with the Owner and shall be performed to minimize operational disruptions and minimize time that equipment may be out of service.

3.02 INSTALLATION

A. Installation shall include the provision of materials, and the coordination of all details, necessary to properly install the instruments including location, arrangement in piping, power source, signal wiring and conduit, special brackets, and all mounting hardware.

B. All instrumentation devices shall be installed in accordance with the manufacturer’s installation requirements.

C. Wiring practices for intrinsically safe systems shall be in accordance with ISA RP12.06.01.

D. Instruments shall be installed so that the various components are accessible for maintenance. Care shall be taken in the installation to ensure sufficient space is

provided between instruments and other equipment, including piping, for ease of removal and servicing. All instruments shall be readily accessible from grade, permanent platforms, or fixed ladders.

3.03 STARTUP AND TRAINING

A. The Contractor shall provide the services of component manufacturer's factory trained personnel for the supervision of installation, initialization, and calibration of equipment.

1. These services shall also include a minimum of one eight-hour day to instruct the Owner's personnel in the operation and maintenance of the equipment. Specifically, these services shall be provided for but not limited to the following equipment items: All new equipment that is provided by Contractor.

PART 4 SPECIAL PROVISIONS

4.01 GENERAL

A. Schedules included herein are intended to supplement the Drawings and are not guaranteed to be complete. All instrumentation devices shown in the Contract Documents or otherwise required to complete the Work shall be furnished and installed.

4.02 LEVEL INSTRUMENT SCHEDULE

A. The following schedule is a listing of level instruments to be installed including: radar and sonic transducers, capacitance probes, and floats.

B. The following letter designations are used in the schedule:

Item Designation:

LT-1	First Letter	L	=	Indicates Level Device
	Second Letter	T	=	Function, Indicator and Transmitter
	Number	1	=	Item Number

Function:

S	Switch
I	Indicator
T	Transmitter

Range: As noted

C. Level instruments are numbered on the Drawings and scheduled as follows for the Franklin Street Pump Stations:

Item Designation.	Process Function	Power Supply	NEMA Rating	Dwg No.	Spec No.
LS-1	Raw Sewage	120 VAC	4X	PE-1	2.07 A
LS-2	Raw Sewage	120 VAC	4X	PE-1	2.07 A
LS-3	Raw Sewage	120 VAC	4X	PE-1	2.07 A
LS-4	Raw Sewage	120 VAC	4X	PE-1	2.07 A
LS-5	Raw Sewage	120 VAC	4X	PE-1	2.07 A

D. Level instruments are numbered on the Drawings and scheduled as follows for the Industrial Drive Pump Stations:

Item Designation.	Process Function	Power Supply	NEMA Rating	Dwg No.	Spec No.
LS-1	Raw Sewage	120 VAC	4X	PE-4	2.07 A
LS-2	Raw Sewage	120 VAC	4X	PE-4	2.07 A
LS-3	Raw Sewage	120 VAC	4X	PE-4	2.07 A
LS-4	Raw Sewage	120 VAC	4X	PE-4	2.07 A
LS-5 (Spare)	Raw Sewage	120 VAC	4X	PE-4	2.07 A

E. The existing level device will be removed by the City and reused in Franklin Street pump station. The Contractor is to wire and install the level device.

4.03 FLOW INSTRUMENT

A. The following schedule is a listing of new flow devices to be installed.

B. The following letter designations are used in the schedule:

Item Designation:

First Letter - Device
F = Flow Measurement Device

Second Letter - Function
T = Transmitter (IT = Indicating Transmitter)
E = Sensor Element

Flow devices are numbered on the Drawings and scheduled as follows:

Item Designation	Measurement	Pipe Size	Process Conditions	Power Supply	NEMA Rating	Spec No.
FIT/FE-1	Flow at Franklin Street Pump Station	8-inch	Raw Sewage	120	4X	2.08 A

C. The Contractor shall be responsible for determining the correct cable length for each flow meter device provided, including a minimum of 4 feet of extra length provided and looped buried below grade at the flow station device.

END OF SECTION