ERIE COUNTY WATER AUTHORITY
AUTHORIZATION FORM
For Approval/Execution of Documents
(check which apply)

Contract: GHD-007 **Project No.:** 201800138
Project Description: Guenther Pump Station Rehabilitation

Item Description:

- [ ] Agreement
- [ ] Professional Service Contract
- [ ] Amendment
- [ ] Change Order
- [ ] BCD
- [ ] NYSDOT Agreement
- [X] Contract Documents
- [ ] Addendum
- [ ] Recommendation for Award of Contract
- [ ] Recommendation to Reject Bids
- [ ] Request for Proposals
- [ ] Other

Action Requested:

- [ ] Board Authorization to Execute
- [X] Legal Approval
- [ ] Board Authorization to Award
- [ ] Execution by the Chairman
- [X] Board Authorization to Advertise for Bids
- [ ] Execution by the Secretary to the Authority
- [ ] Board Authorization to Solicit Request for Proposals
- [ ] Other

Approvals Needed:

APPROVED AS TO CONTENT:

[X]	Sr. Distribution Engineer		Date: 11/23/2020
[X]	Chief Operating Officer		Date: 11/23/2020
[X]	Executive Engineer	/for L. Kowalski	Date: 11/23/2020
[X]	Director of Administration		Date: 11/23/2020
[X]	Risk Manager		Date: 11/23/2020
[X]	Chief Financial Officer		Date: 11/23/2020
[X]	Legal		Date: 11/23/2020

APPROVED FOR BOARD RESOLUTION:

[X]	Secretary to the Authority		Date: 11/24/20

Remarks: Unit price contract.

Resolution Date: _____ **Item No:** _____

ERIE COUNTY WATER AUTHORITY

INTEROFFICE MEMORANDUM

November 23, 2020

To: Terrence D. McCracken, Secretary to the Authority

From: Clayton J. Johnson, Production Engineer CJJ

Subject: Contract GHD-007
Guenther Pump Station Rehabilitation
ECWA Project No. 201800138

The following documents are attached:

- Blue Authorization Form – this form provides the project name and project number, the action that is being requested of the Board (resolution to advertise for bids) and a list of approvals that are required prior to being acted on by the Board.
- One Project Manual.

The above referenced project was designed by GHD.

Contract GH-007 includes:

1. Rehabilitation/upgrade of the existing pump station including replacement of four pumps with right-sized pumps with variable frequency drives, pump suction/discharge and valve replacement, and surge relief piping replacement.
2. Providing standby electrical generator within a new generator building.
3. Construction of a new building to house the generator, electrical room, and Line Maintenance crew materials.
4. Interior process piping and yard piping improvements, including site drainage. Replacement of pump station bypass valves.
5. Architectural, structural, HVAC, and electrical improvements to Pump Station, additional building, and the nearby valve house.

MJQ:jmf
Attachments
cc: R.Stoll
L.Kowalski
M.Wymer
L.Lester
CONT-GHD-007-2001-X-012

Set No: _____

Project Manual

Contract No.: GHD-07

Water System Improvements
Guenther Pump Station Rehabilitation

Project No. 201800138

December 2020

Erie County Water Authority

3030 Union Road
Cheektowaga, New York 14227

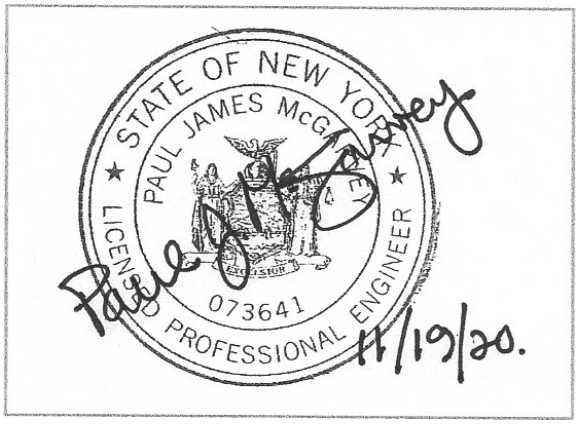
ERIE COUNTY WATER AUTHORITY
BUFFALO, NEW YORK

CONTRACT NO: GHD-07
WATER SYSTEM IMPROVEMENTS
GUENTHER PUMP STATION REHABILITATION

ECWA PROJECT NO: 201800138

DECEMBER 2020

This Project Manual and Contract Drawings were prepared under the direct supervision of a Professional Engineer by: GHD Consulting Services Inc.



ERIE COUNTY WATER AUTHORITY
3030 Union Road
Cheektowaga, New York 14227

ERIE COUNTY WATER AUTHORITY
BUFFALO, NEW YORK

CONTRACT NO: GHD-07
GUENTHER PUMP STATION REHABILITATION
PROJECT NO: 201800138

TABLE OF CONTENTS

APPENDICES

LIST OF DRAWINGS

END OF TABLE OF CONTENTS

ERIE COUNTY WATER AUTHORITY
3030 UNION ROAD
CHEEKTOWAGA, NEW YORK 14227

CONTRACT NO: GHD-07
WATER SYSTEM IMPROVEMENTS GUENTHER PUMP STATION REHABILITATION
PROJECT NO: 201800138

NOTICE TO BIDDERS

The Erie County Water Authority will receive separate, sealed bids for the furnishing of all labor, plant, tools, equipment and specified materials, etc. for ERIE COUNTY WATER AUTHORITY, Guenther Pump Station Rehabilitation Guenther Pump Station TOWN OF Hamburg The Work consists of a single contract for the rehabilitation of the Guenther Pump Station on Pleasant Avenue, Town of Hamburg

Bids will be received by the Erie County Water Authority until (Time) a.m. prevailing time, on (Day of week, Date) at the Service Center Front Desk, Erie County Water Authority, 3030 Union Road, Cheektowaga, New York 14227.

All bid openings are recorded and posted on the ECWA website, along with the bids results.

When permitted, members of the public may be present to observe the bid opening. All attendees must bring a government-issued photo identification (driver's license preferred) and check-in with the ECWA receptionist before being allowed entry to the bid opening.

Whenever the Erie County Water Authority is operating under a Declaration of Emergency due to a pandemic or other general state of emergencies, members of the public may be precluded from being present at such bid opening.

ANYONE ENTERING THE SERVICE CENTER OR OTHER AUTHORITY FACILITIES IS SUBJECT TO SUCH RESTRICTIONS OR LIMITATIONS IN PLACE AT THE TIME OF ENTRY.

All bids being mailed (including FedEx, UPS, Priority Mail, etc.) or hand-delivered to the Erie County Water Authority shall be directed to the "SERVICE CENTER FRONT DESK" at the address listed above in a sealed envelope and be clearly marked on the outside of the mailing or hand-delivered envelope "BID ENCLOSED-ECWA Guenther Pump Station Rehabilitation, Pleasant Avenue, Town of Hamburg". Failure to follow the above instructions could result in rejection of the bid.

Beginning at 9:00 a.m., on (Day of week, Date), the Contract Documents may be viewed online and ordered through Avalon Plan Room, at: www.avalonplanroom.com in the "Private Bid" section. To obtain the "Private Key Code", to access the Contract Documents, contact Matthew Skuse (contact information included at the end of this section). If you have questions on ordering from Avalon, please contact Avalon Document Services at (716) 995-7777.

A non-refundable payment of ? ($?) payable to Avalon Document Services is required to obtain the Contract Documents for this contract. Cash payments will not be accepted. The payment includes shipping of the documents to anywhere in the Continental United States. By submission of the non-refundable payment, bidder will be registered as an official planholder. Only official planholders are eligible to bid on the project. Subcontractors, suppliers, equipment vendors, etc., will also be required to submit the non-refundable payment in order to receive the Contract Documents. Partial sets of documents will not be available.

Each bid shall be accompanied by a certified check or bid bond in the amount of five percent (5%) of the amount of the bid.

A non-mandatory Pre-Bid informational meeting will be held at 10:00 a.m. local time, Day of week, Date, to discuss the project via teleconference call with online video conference. Prospective bidders who wish to access the Pre-Bid meeting teleconference call may request the required login information by emailing Matthew Skuse. All requests for the login information shall be before 9:00 a.m. local time, Day of week, Date. All prospective bidders are strongly encouraged to partake in the Pre-Bid meeting teleconference call.

Project site visit(s) are scheduled for Day of week, Date, between the hours of 9:00 a.m. and 2:30 p.m., local time. All parties wishing to visit the site must contact the Engineer, Matthew Skuse. All requests shall be received before 5:00 p.m. local time, Day of week, Date. The Engineer will schedule individual site visits accordingly and notify all parties.

In accordance with State Finance Law §§139-j and 139-k, all questions about meaning or intent of the bidding documents shall be submitted to the designated contact person in writing. The designated contact is Matthew Skuse.

The Erie County Water Authority reserves the right to reject any and all bids or to accept any bid deemed to be for the best interest of the Water Authority even though the proposal chosen may result in the award of the contract to a bidder whose bid is not mathematically lowest.

ERIE COUNTY WATER AUTHORITY

TERRENCE D. McCRACKEN
Secretary to the Authority

Engineer:
GHD Consulting Services Inc.
285 Delaware Ave. Suite 500. Buffalo, NY 14202
Email: matthew.skuse@ghd.com
Matthew Skuse Phone: 716-856-2142
Fax: 716-856-2160

ERIE COUNTY WATER AUTHORITY
BUFFALO, NEW YORK

CONTRACT NO.: GHD-07
WATER SYSTEM IMPROVEMENTS GUENTHER PUMP STATION REHABILITATION
PROJECT NO.: 201800138

SECTION 00200

INSTRUCTIONS TO BIDDERS

TABLE OF ARTICLES

ARTICLE 1 - DEFINED TERMS

1.01 Terms used in these Instructions to Bidders will have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof.

1.02 Additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof.

A. Bidder: The individual or entity who submits a Bid directly to OWNER.

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 submitting a responsive Bid to whom OWNER (on the basis of OWNER'S evaluation as hereinafter provided) makes an award. Also known as CONTRACTOR.

D. ENGINEER: As defined in the Agreement, Section 00500, under Article 2.

ARTICLE 2 - BIDS RECEIVED

2.01 Refer to Notice to Bidders for information on receipt of Bids.

ARTICLE 3 - LOCATION AND SCOPE OF WORK

3.01 Refer to Section 01010 of the General Requirements for the location and scope of the Work.

ARTICLE 4 - COPIES OF BIDDING DOCUMENTS

4.01 Refer to Notice to Bidders for information on examination and procurement of Bidding Documents.

4.02 The Issuing Office is the Service Center Front Desk of the Erie County Water Authority, 3030 Union Road, Cheektowaga, New York 14227.

4.03 Complete sets of Bidding Documents must 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.

4.04 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 confer a license or grant permission for any other use.

ARTICLE 5 - QUALIFICATIONS OF BIDDERS

5.01 Bidders shall be experienced in the kind of Work to be performed, shall have the necessary equipment therefore, and shall possess sufficient capital to properly execute the Work within the time allowed. Bids received from Bidders who have previously failed to complete work within the time required, or who have previously performed similar work in an unsatisfactory manner, may be rejected. A Bid may be rejected if Bidder cannot show that Bidder has the necessary ability, plant and equipment to commence the Work at the time prescribed and thereafter to prosecute and complete the Work at the rate or within the time specified. A Bid may be rejected if Bidder is already obligated for the performance of other work which would delay the commencement, prosecution or completion of the Work.

5.02 To demonstrate qualifications to perform the Work, Bidder shall complete and submit with its Bid the Bidder Qualifications Statement which is bound in the Project Manual. Bidders may be asked to furnish additional data to demonstrate their qualifications.

5.03 Bidders shall be qualified to do business in the state where the Project is located or covenant to obtain such qualification prior to signing the Agreement.

ARTICLE 6 - EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

6.01 Subsurface and Physical Conditions

A. The Supplementary Conditions identify:
   1. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site which have been utilized by ENGINEER in preparation of the Bidding Documents.
   2. Those drawings of physical conditions in or relating to existing surface and subsurface structures (except underground facilities) which are at or contiguous to the Site that have been utilized by ENGINEER in preparation of the Bidding Documents.

B. Copies of the reports and drawings referenced in the Supplementary Conditions will be made available by ENGINEER to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in paragraph 4.02 of the General Conditions has been identified and established in paragraph SC-4.02 of the

Supplementary Conditions. Bidder is responsible for any interpretation or conclusion drawn from any "technical data" or any other data, interpretations, opinions or information contained in such reports or shown or indicated in such drawings.

6.02 Underground Facilities - Physical Conditions

A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to OWNER and ENGINEER by owners of such Underground Facilities, including OWNER, or others.

6.03 Hazardous Environmental Condition

A. The CONTRACTOR'S attention is directed to the information contained in the reports listed in Section 00800 SC-4.02 and Appendix D, which contain existing asbestos and lead survey results.

6.04 Provisions concerning responsibilities for the adequacy of data, if any, 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 unforeseen conditions appear in paragraphs 4.02, 4.03 and 4.04 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 Bidding 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 Work appear in paragraph 4.06 of the General Conditions.

6.05 On request, OWNER will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests and studies as each Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former conditions upon completion of such explorations, investigations, tests and studies.

6.06 On request, OWNER will conduct a Site visit during OWNER'S normal business hours.

6.07 Reference is made to the Supplementary Conditions for identification of the general nature of other work that is to be performed at the Site by OWNER or others (such as utilities and other prime contractors) that relates to the Work for which a Bid is to be submitted. On request, and if available, OWNER will provide to Bidder, for examination, access to or copies of the contract documents for such other work.

6.08 It is the responsibility of Bidder, before submitting a Bid to:

A. Examine and carefully study the Bidding Documents, including any Addenda and the other related data identified in the Bidding Documents;

B. Visit the Site and become familiar with and satisfy Bidder as to the general, local and Site conditions that may affect cost, progress and performance of the Work;

C. Become familiar with and satisfy Bidder as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work;

D. Carefully study all reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions, and to carefully study all reports and drawings of a Hazardous Environmental Condition identified at the Site, if any, which have been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions;

E. Obtain and carefully study (or assume responsibility for having done so) all examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by Bidder, including any specific means, methods, techniques, sequences and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto;

F. Agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for the performance of the Work at the price bid and within the times and in accordance with the other terms and conditions of the Bidding Documents;

G. Become aware of the general nature of work (if any) to be performed by OWNER and others at the Site that relates to the Work as indicated in the Bidding Documents;

H. Correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies and data with the Bidding Documents;

I. 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; and

J. Determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

6.09 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 6, that without exception the Bid is premised upon performing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences or procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by ENGINEER are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing the Work.

ARTICLE 7 - PRE-BID CONFERENCE

7.01 A pre-bid conference will be held if so indicated in the Notice to Bidders, and will be as follows. Representatives of the OWNER and ENGINEER will be present to discuss the Project. Bidders are encouraged to attend and participate at the conference. ENGINEER will transmit to all prospective Bidders of record such Addenda as ENGINEER considers necessary in response to questions raised at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 8 - SITE AND OTHER AREAS

8.01 The Site is identified in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment, to be incorporated into the Work are to be obtained and paid for by CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by OWNER unless otherwise provided in the Bidding Documents.

ARTICLE 9 - INTERPRETATIONS AND ADDENDA

9.01 All questions about the meaning or intent of the Bidding Documents shall be submitted to ENGINEER in writing. In order to receive consideration, questions must be received by ENGINEER at least ten (10) days prior to the date for the opening of Bids. Interpretations, clarifications, and/or supplemental instructions considered necessary by ENGINEER in response to such questions will be issued by Addenda, mailed either by

Registered or Certified mail, with return receipt requested, to all parties recorded by ENGINEER as having received the Bidding Documents, for receipt not later than three (3) days prior to the date for the opening of Bids. Failure of any Bidder to receive such Addendum or interpretation shall not relieve any bidder from any obligation under his bid submitted. All Addenda so issued shall become part of the Contract Documents. All Addenda must be submitted with the bid proposal and be properly signed by the Bidder as part of the Bid Documents. Only questions answered by Addenda will be binding. The OWNER will not be responsible for any other explanations or interpretation of such documents which anyone presumes to make on behalf of the OWNER before expiration of the time set for the receipt of Bids. No interpretation of the meaning of the plans, specifications or other Contract Documents will be made to any bidder orally. Oral and other interpretations or clarifications will be without legal effect.

9.02 Addenda may also be issued to clarify, correct or change the Bidding Documents as deemed advisable by OWNER or ENGINEER. Such Addenda, if any, will be issued in the manner and within the time period stated in paragraph 9.01.

ARTICLE 10 - BID SECURITY

10.01 A Bid must be accompanied by Bid security made payable to the OWNER in the amount of five percent of Bidder's maximum Bid price and in the form of certified check or Bid Bond.

10.02 Bid Bond shall be on the form bound in the Project Manual. Bid Bond shall be issued by a surety meeting the requirements of paragraphs 5.01 and 5.02 of the General Conditions. The Bid Bond must contain original signatures in ink. Pencil, stamped, thermal faxed, Xeroxed, or any other copies of the signature shall be grounds for voiding the Bid.

10.03 The Bid security of the Successful Bidder will be retained until 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 returned. If the Successful Bidder fails to sign and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, OWNER may annul the Notice of Award and the Bid security of that Bidder will be forfeited to the OWNER as liquidated damages for such failure.

10.04 The Bid security of the three lowest bidders may be retained by OWNER until the earlier of the seventh day after the Effective Date of the Agreement or the forty-first day after the Bid opening whereupon the Bid security furnished by such Bidders will be returned. The Bid security of Bidders whom OWNER believes do not have a reasonable chance of receiving an award will be returned within seven days of the Bid opening.

ARTICLE 11 - CONTRACT TIMES

11.01 The number of days within which the Work is to be substantially completed and also completed and ready for final payment (the Contract Times) are set forth in the Agreement.

ARTICLE 12 - LIQUIDATED AND SPECIAL DAMAGES

12.01 Provisions for liquidated and special damages, if any, are set forth in the Agreement.

ARTICLE 13 - SUBSTITUTE AND "OR EQUAL" ITEMS

13.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or-equal" items. Whenever it is specified or described in the Bidding Documents that a substitute or "or-equal" item of material or equipment may be furnished or used by CONTRACTOR if acceptable to ENGINEER, application for such acceptance will not be considered by ENGINEER until after the Effective Date of the Agreement. The procedure for submittal of any such application by CONTRACTOR and consideration by ENGINEER is set forth in the General Conditions which may be supplemented in the General Requirements.

13.02 Refer to Section 01630 of the General Requirements for the period of time after the Effective Date of the Agreement during which the ENGINEER will accept applications for substitute or "or-equal" items of material or equipment.

ARTICLE 14 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS

14.01 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals or entities to be submitted to OWNER in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening submit to OWNER a list of all such Subcontractors, Suppliers, other individuals or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualifications for each such Subcontractor, Supplier, individual or entity if requested by OWNER. 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 the apparent Successful Bidder to submit an acceptable substitute without an increase in Bid price.

14.02 If apparent Successful Bidder declines to make any such substitution, OWNER may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers and other individuals or entities. Declining to make requested substitutions will not 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 revocation of such acceptance after the Effective Date of the Agreement as provided in paragraph 6.06 of the General Conditions.

14.03 CONTRACTOR shall not be required to employ any Subcontractor, Supplier, individual or entity against whom CONTRACTOR has reasonable objection.

ARTICLE 15 - PREPARATION OF BID

15.01 A Bid must be made on the Bid form bound in the Project Manual. The Bid form shall not be separated from the Project Manual nor shall it be altered in any way.

15.02 All blanks in the Bid Form shall be completed by printing in black ink or by typewriter. A Bid price shall be indicated in both words and numbers for each Bid item listed therein or the words "No Bid" or "Not Applicable" entered. In case of discrepancy between the words and the numerals, the words shall govern. Ditto marks are not considered writing or printing and shall not be used.

15.03 A Bid shall be executed as stated below.

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

B. A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title shall appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown below the signature.

C. A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid form. The official address of the joint venture shall be shown below the signature.

D. A Bid by a corporation shall be executed in the corporate name by an officer of the corporation and shall be accompanied by a certified copy of a resolution of the board of directors authorizing the person signing the Bid to do so on behalf of the corporation. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The state of incorporation and the official corporate address shall be shown below the signature.

E. A Bid by a limited liability company shall be executed in the name of the firm and signed by a member accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown below the signature.

F. All names shall be typed or printed in black ink below the signature.

G. Evidence of authority to conduct business as an out-of-state corporation in the state where the Work is to be performed shall be provided, if applicable.

15.04 The Bid shall contain an acknowledgment of the receipt of all Addenda in the space provided on the Bid form.

15.05 The address and telephone number for communications regarding the Bid shall be shown.

15.06 In addition to the Bid Form, the following listed documents, which are bound in the Project Manual in Section 00430 - Bid Form Supplements and Section 00450 – Bidder's Qualification Statement, shall be submitted with the Bid. Each document shall be executed in the manner described in paragraph 15.03 unless another manner is indicated.

A. Bid Security Form.

B. Section 2875 of the Public Authorities Law.

C. Section 2876 of the Public Authorities Law.

D. Section 2878 of the Public Authorities Law, Non-collusive Bidding Certification.

E. State Finance Law Requirements.

F. Section 139-L of the State Finance Law, Statement relating to Sexual Harassment Policy.

G. Bidder's Qualification Statement, including Attachments A, B, C and D and Bidder's "Experience in The Installation of Tapping Sleeves & Valves on Prestressed Concrete Cylinder Pipe," if applicable.

H. All Addenda.

ARTICLE 16 - BASIS OF BIDS; COMPARISON OF BIDS

16.01 Lump Sum and Unit Price

A. Bidder shall submit its Bid on the basis of each lump sum item and unit price item as set forth in the Bid Form. For each unit price item on the Bid form, Bidder shall enter the unit price Bid, and shall enter the computation of the respective quantity times the Bidder's unit price for that item. Bidder shall compute and enter in the space provided on the Bid form, the total of all lump sum items and the total of the products of quantity and unit price Bid for each unit price item.

B. For determination of the apparent low Bidder, Bids will be evaluated on the basis of the total of all lump sum items and the total of the products of the estimated quantity of each item and unit price Bid for that item.

C. The quantities for the unit price items are unpredictable and the ENGINEER has inserted certain quantities in the Bid Form to be used solely for purpose of comparison bids.

D. Fixed minimum unit prices may have been established for some of the items in the Bid. The prices represent the minimum amounts which will be paid the CONTRACTOR for these items. If in the opinion of the Bidder these prices do not reflect the actual value of the work involved the Bidder may void the given fixed minimum unit price for that specific item and enter a higher unit price in the spaces provided in the Bid Sheets.

16.02 Discrepancies between words and figures will be resolved in favor of words. 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.

ARTICLE 17 - SUBMITTAL OF BID

17.01 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Notice to Bidders. The entire Project Manual must be submitted with all proper forms completed and signed as required.

17.02 Bid shall be enclosed in an opaque sealed envelope plainly marked on the outside with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted) the name and address of the Bidder and its license or registration number, if applicable. Bid shall be accompanied by Bid security and other required documents.

17.03 All bids being mailed (including FedEx, UPS, Priority Mail, etc.) or hand-delivered to the Erie County Water Authority shall follow the procedure as defined in Section 00100, Notice To Bidders.

ARTICLE 18 - MODIFICATION OR WITHDRAWAL OF BID

18.01 Withdrawal Prior to Bid Opening:

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

18.02 Modification Prior to Bid Opening:

A. If a Bidder wishes to modify its Bid, Bidder must withdraw its initial Bid in the manner specified in paragraph 18.01.A and submit a new Bid.

18.03 No Bids may be withdrawn after the time set for the Bid Opening.

ARTICLE 19 - OPENING OF BIDS

19.01 Bids will be opened at the time and place where Bids are to be submitted and, unless obviously non-responsive, read aloud publicly. An abstract of the Bids will be made available to Bidders after the opening.

19.02 Bids received by mail or otherwise after the date and time specified for the opening of Bids will not be accepted and will be returned to the Bidder unopened.

19.03 Bid results are available on the Erie County Water Authority website, www.ecwa.org (under Doing Business tab, select option Business Opportunities). No bid results will be given over the telephone.

ARTICLE 20 - DISQUALIFICATION OF BIDDERS

20.01 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

ARTICLE 21 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

21.01 All Bids shall remain subject to acceptance for forty five days after the day of the Bid opening, but OWNER may, in its sole discretion, release any Bid and return the Bid security prior to that date.

21.02 In the event that the OWNER requires more than 45 calendar days after the actual date of the Bid Opening to award the contract, Bidders shall, when requested, provide to ENGINEER a written extension of time for OWNER to award the contract. Bidders shall also provide, to ENGINEER, written Consent of Surety for extension of the bid bond.

21.03 In the event that the OWNER requires more than 45 calendar days after the actual date of the Bid Opening to award the contract, and the lowest qualified bidder does not grant an extension of time for the OWNER to award the contract, the OWNER reserves the right to award to the second lowest qualified bidder.

ARTICLE 22 - AWARD OF CONTRACT

22.01 OWNER reserves the right to reject any or all Bids, including without limitation the right to reject any or all nonconforming, non-responsive or conditional Bids. Bids may be rejected if they show any omissions, alterations of form, additions not called for, conditional or alternate bids other than are provided for in the Bid Form, bids containing escalation clauses or irregularities of any kind. OWNER further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to be non-responsible. OWNER also reserves the right to waive any informality not involving price, time or changes in the Work, if it is deemed to be in the best interest of the OWNER. The Bidder will not be allowed to take advantage of any error or omission.

22.02 OWNER reserves the right to reject any Bid not accompanied by specified documentation and Bid security. In the event that OWNER requires more than 45 calendar days after the actual Bid opening date to award the contract, Bidders shall provide to ENGINEER written Consent of Surety of the Bid Bond.

22.03 OWNER reserves the right to reject any Bid that, in its sole discretion, is considered to be unbalanced or unreasonable as to the amount bid for any lump sum or unit price item.

22.04 In evaluating Bidders, OWNER will consider their qualifications whether or not their Bids comply with the prescribed requirements, the alternatives, if any, the lump sum and unit prices, and other data as may be requested in the Bid Form or prior to the Notice of Award.

22.05 OWNER may consider the qualifications and experience of Subcontractors, Suppliers and other individuals or entities proposed for those portions of the Work for which the

identity of Subcontractors, Suppliers and other individuals or entities must be submitted as provided in the Supplementary Conditions.

22.06 OWNER may conduct such investigations as OWNER deems necessary to establish the responsibility, qualifications and financial ability of the Bidders to perform the Work in accordance with the Contract Documents. OWNER reserves the right to reject the Bid of any Bidder who does not pass any such evaluation to OWNER'S satisfaction.

22.07 OWNER reserves the right to accept any Bid deemed to be in its best interests even though the Bid chosen may result in the award of the Contract to a Bidder whose Bid is not, on a mathematical basis alone, the low Bid.

22.08 The OWNER may elect not to award a contract at this time due to budgetary or other considerations. OWNER reserves the right to reject any or all proposals and to re-bid the contract if the OWNER deems it in the public interest to do so.

22.09 Contracts shall be awarded only pursuant to resolution.

22.10 OWNER reserves the right to reject any bids from Bidders who are in arrears to, or in litigation with, the Erie County Water Authority or the County of Erie upon any debt or contract, or in default as surety or otherwise upon any obligation of the Erie County Water Authority or the County of Erie.

ARTICLE 23 - CONTRACT SECURITIES

23.01 Performance Bond shall be in the form of Engineers Joint Contract Documents Committee (EJCDC) "Construction Performance Bond," 1910-28-A. Payment Bond shall be in the form of EJCDC "Construction Payment Bond," 1910-28-B. The amounts of and other requirements for Performance and Payment Bonds are stated in paragraph 5.01 of the General Conditions. The requirements for delivery of Bonds are stated in paragraph 2.01 of the General Conditions. Additional requirements may be stated in the Supplementary Conditions.

23.02 Successful Bidder shall within five days from the date of the Notice of Award deliver to OWNER, for OWNER'S review and approval, the Performance Bond and the Payment Bond CONTRACTOR proposes to furnish at the time of the execution of the Agreement.

ARTICLE 24 – CONTRACTOR'S INSURANCE

24.01 The requirements for CONTRACTOR'S insurance and delivery of insurance certificates are stated in Article 5 of the General Conditions and in the Supplementary Conditions.

ARTICLE 25 - SIGNING OF AGREEMENT

25.01 When OWNER gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents, which are identified in the Agreement as attached thereto. Within five days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to OWNER.

ARTICLE 26 - NOTICE TO PROCEED

26.01 Issuance of the Notice to Proceed shall be as stated in Article 2 of the General Conditions.

ARTICLE 27 - PARTNERING (NOT USED)

ARTICLE 28 - SALES AND USE TAXES

28.01 Refer to Supplementary Conditions paragraph SC-6.10 for information on OWNER'S exemption from sales and use taxes on materials and equipment to be incorporated into the Work. Do not include said taxes in Bid.

ARTICLE 29 - ADDITIONAL REQUIREMENTS

29.01 Refer to Supplementary Conditions Paragraph SC-18.03 for information on OWNER'S Women and Minority Business Enterprise requirements.

29.02 Refer to Supplementary Conditions Paragraph SC-18.06 for information on OWNER'S Apprenticeship policy.

END OF SECTION

ERIE COUNTY WATER AUTHORITY
BUFFALO, NEW YORK

CONTRACT NO: GHD-07
WATER SYSTEM IMPROVEMENTS GUENTHER PUMP STATION REHABILITATION
PROJECT NO: 201800138

SECTION 00320

GEOTECHNICAL DATA

ARTICLE 1 - GENERAL

1.01 Subsurface soil investigations have been made and the results are available as defined in Section 00800, Supplementary Conditions.

1.02 The subsurface investigation report was prepared by Barron and Associates, P.C. & Buffalo Drilling Company and is provided as a reference source located in Appendix E for CONTRACTORS in the preparation of Bids and in the performance of their work. These investigations are for examination by Bidders but are not a part of the Contract Documents and are included for informational purposes only.

1.03 Bidder is responsible for any conclusions drawn from soil investigation data. If he prefers not to assume such risk, he is under obligation to employ his own experts to analyze available information. Bidder is responsible for any consequences of acting on conclusions obtained.

1.04 OWNER does not guarantee continuity of conditions indicated at soil investigation locations.

END OF SECTION

ERIE COUNTY WATER AUTHORITY
BUFFALO, NEW YORK

CONTRACT NO: GHD-07
WATER SYSTEM IMPROVEMENTS GUENTHER PUMP STATION REHABILITATION
PROJECT NO: 201800138

SECTION 00360

PERMIT APPLICATIONS

ARTICLE 1 - GENERAL

1.01 CONTRACTOR shall apply for and is responsible for complying with all requirements of all applicable Federal, State, and Local Permits.

1.02 CONTRACTOR shall include all permit fees and permit requirements in his unit bid prices for the project and will not receive separate payment for any permit fees, including all associated permit conditions.

END OF SECTION

ERIE COUNTY WATER AUTHORITY
BUFFALO, NEW YORK

CONTRACT NO: GHD-07
WATER SYSTEM IMPROVEMENTS GUENTHER PUMP STATION REHABILITATION
PROJECT NO: 201800138

(This Bid Form shall not be detached from the Project Manual. The entire Project Manual shall be returned with the executed Bid.)

SECTION 00410

BID FORMS

BID FOR:

Erie County Water Authority
Contract No: GHD-07
Guenther Pump Station Rehabilitation
Project No. 201800138

BID TO:

Service Center Front Desk
Erie County Water Authority
3030 Union Road
Cheektowaga, New York 14227

BID FROM: _____
(Print or Type Name of Bidder)
(/A Corporation/A Partnership/A Limited Liability Company/An Individual/A Joint Venture/[Bidder to strike out inapplicable terms.])

Gentlemen:

1.01 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 price(s) and within the times indicated in this Bid and in accordance with the Bidding Documents.

2.01 Bidder accepts all of the terms and conditions of the Notice to Bidders and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain open subject to acceptance for the time period set forth in the Instruction to Bidders. Bidder will sign the Agreement and will furnish the required contract security, and other required documents within the time periods set forth in the Bidding Documents.

3.01 In submitting this Bid, Bidder represents, as set forth in the Agreement, that:

A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, if any, and the following Addenda receipt of all of which is hereby acknowledged.

Addendum No.	Date Received	Addendum No.	Date Received
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance for the Work.

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

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions, and (2) reports and drawings of a Hazardous Environmental Condition identified at the Site, if any, which have been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions.

E. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be

employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

F. Bidder does not consider that any further examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance of the Work at the price(s) and within the times 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 correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents and all additional examinations, investigations, explorations, tests, studies and data with the Bidding Documents.

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

J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

K. The quantities for the unit price items are unpredictable and the ENGINEER has inserted certain quantities in the proposal to be used solely for purpose of comparison of bids.

L. Fixed minimum unit prices may have been established for some of the items in the Bid. The prices represent the minimum amounts, which will be paid the CONTRACTOR for these items. The Bidder shall include a price not less than the stated minimum. If in the opinion of the Bidder these prices do not reflect the actual value of the work involved, the Bidder may void the given fixed minimum unit price for that specific item and enter a higher unit price in the spaces provided in the Bid Form sheets. Bidder's Proposals received which include a unit price less than the stated minimum shall be adjusted to meet the fixed minimum unit price.

4.01 Bidder further represents that this Bid is genuine and is not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding; Bidder has not sought by collusion to obtain for itself any advantage over any other

Bidder or over OWNER; and that no person or persons acting in any official capacity for the OWNER are directly or indirectly interested in this Bid, or in any portion of the profit thereof.

5.01 Bidder will complete the Work in accordance with the Contract Documents for:

BASE BID

Description	Estimated Quantities	Computed Totals

Item 1 – Pump Station Rehabilitation

Item 1A – Existing Building Improvements

Item 1A- For furnishing and installing
Existing Building Improvements at the Lump Sum price of
_____ Dollars

and _____ Cents
($) Lump Sum LS $_____

Item 1B – New Generator Building Addition

Item 1B- For furnishing and installing
New Generator Building Addition
at the Lump Sum price of
_____ Dollars

and _____ Cents
($) Lump Sum LS $_____

Item 1C – Brick Repointing

Item 1C- For furnishing and installing
Brick Repointing on the Existing Pump Station Building
at the per Linear Foot price of
_____ Dollars

and _____ Cents
($) Per Linear Foot (400) LF $_____

Item 1D – Brick Replacement

Item 1D- For furnishing and installing
Brick Replacement on the Existing Pump Station Building
at the Per Each price of
_____ Dollars

and _____ Cents
($) Per Each (525) EA $_____

Item 2 – Cash Allowance

Item 2A – Cash Allowance for NYSEG Work

Sixty Thousand Dollars

and zero Cents
($ 60,000) Lump Sum LS $ 60,000

Item 2B – Cash Allowance for PLC and SCADA System Work

Twenty - Five Thousand Dollars

and zero Cents
($ 25,000) Lump Sum LS $ 25,000

Item 3 – Contingency Allowance

Item 3 – Contingency Allowance for Miscellaneous Work

Three Hundred Thousand Dollars

and zero Cents
($ 300,000) Lump Sum LS $ 300,000

ERIE COUNTY WATER AUTHORITY
CONTRACT NO: GHD-07
GUENTHER PUMP STATION REHABILITATION

TOTAL BASE BID AMOUNT (This total is for convenience in comparing Bids and is not an official part of this Bid.) $_____ (Figures)

_____

_____Dollars and _____ Cents
(Written Amount)

ERIE COUNTY WATER AUTHORITY
CONTRACT NO: GHD-07
GUENTHER PUMP STATION REHABILITATION

Unit prices have been computed in accordance with paragraph 11.03.B of the General Conditions.

Bidder acknowledges that estimated quantities of items of Unit Price Work are not guaranteed and final payment will be based on actual quantities of Unit Price Work performed as provided in the Contract Documents.

6.01 Bidder agrees that the Work will be substantially complete and completed and ready for final payment in accordance with Paragraph 14.07.B 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 and special damages in the event of failure to complete the Work within the times specified above.

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

A. Required Bid security in the amount of _____ Dollars ($_____).

B. Section 2875 of the Public Authorities Law.

C. Section 2876 of the Public Authorities Law.

D. Section 2878 of the Public Authorities Law, Non-Collusive Bidding Certification.

E. State Finance Law Requirements

F. Section 139-L of the State Finance Law, Statement relating to Sexual Harassment Policy.

G. Required Bidder Qualifications Statement with supporting data.

H. All addenda

8.01 The terms used in this Bid will have the meanings indicated in the Instructions to Bidders and the General Conditions and Supplementary Conditions.

Respectfully submitted on _____, 20__.

ERIE COUNTY WATER AUTHORITY
CONTRACT NO: GHD-07
GUENTHER PUMP STATION REHABILITATION

If Bidder is:

An Individual

By _____
(Individual's Signature)

_____
(Printed or Typed Name of Individual)

Doing business as _____

License or Registration Number: _____

Business Address: _____

_____

Phone No.: _____ FAX No.: _____

A Partnership

By _____
(Firm Name)

_____
(General Partner's Signature)

_____
(Printed or Typed Name of General Partner)
(Attach evidence of authority to sign.)

License or Registration Number: _____

Business Address: _____

_____

Phone No.: _____ FAX No.: _____

ERIE COUNTY WATER AUTHORITY
CONTRACT NO: GHD-07
GUENTHER PUMP STATION REHABILITATION

A Corporation

By _____
(Corporation Name)

_____
(State of Incorporation)

By _____
(Signature of Officer Authorized to Sign)

_____
(Printed or Typed Name and Title of Officer Authorized to Sign)
(Attach evidence of authority to sign.)

(CORPORATE

SEAL)

Attest _____
(Secretary)

License or Registration Number: _____

Business Address: _____

_____

Phone No.: _____ FAX No.: _____

ERIE COUNTY WATER AUTHORITY
CONTRACT NO: GHD-07
GUENTHER PUMP STATION REHABILITATION

Limited Liability Company

By _____
(Firm Name)

_____
(State of Formation)

By _____
(Signature of Member/Authorized to Sign)

_____
(Printed or Typed Name and Title of Member Authorized to Sign)
(Attach evidence of authority to sign.)

License or Registration Number: _____

Business Address: _____

_____

Phone No.: _____ FAX No.: _____

ERIE COUNTY WATER AUTHORITY
CONTRACT NO: GHD-07
GUENTHER PUMP STATION REHABILITATION

A Joint Venture

Joint Venture Name: _____

By _____
(Signature)

_____ _____
(Printed or Typed Name) (Title)

_____
(Address)

By _____
(Signature)

_____ _____
(Printed or Typed Name) (Title)

_____
(Address)

Phone and FAX number and address for receipt of communications to joint venture:

_____

_____

_____

(Each joint venturer must sign. The manner of signing for each individual, partnership, corporation or limited liability company that is a party to the joint venture shall be in the manner indicated above).

END OF BID FORM

ERIE COUNTY WATER AUTHORITY
BUFFALO, NEW YORK

CONTRACT NO: GHD-07
WATER SYSTEM IMPROVEMENTS GUENTHER PUMP STATION REHABILITATION
PROJECT NO: 201800138

SECTION 00430

BID FORM SUPPLEMENTS

Bid Security Form

Section 2875 of the Public Authorities Law

Section 2876 of the Public Authorities Law

Section 2878 of the Public Authorities Law

State Finance Law Requirements

Section 139-L of the State Finance Law

BID SECURITY FORM

BIDDER (Name and Address):

_____
_____
_____

SURETY (Name and Address of Principal Place of Business):

_____
_____
_____

OWNER:

Erie County Water Authority
295 Main Street, Room 350
Buffalo, New York 14203

BID

BID DUE DATE:_____

PROJECT:
Contract No: GHD-07
WATER SYSTEM IMPROVEMENTS ON GUENTHER PUMP STATION REHABILITATION
Project No: 201800138

BOND

BOND NUMBER:_____
DATE: (Not later than Bid due date):_____
PENAL SUM: _____ _____
(Words) (Figures)

IN WITNESS WHEREOF, Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER	SURETY
_____(Seal)	_____(Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By:_____	By:_____
Signature and Title	Signature and Title (Attach Power of Attorney)
Attest:_____	Attest:_____
Signature and Title	

1.01 Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to OWNER upon default of Bidder the penal sum set forth on the face of this Bond.

2.01 Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents.

3.01 This obligation shall be null and void if:

A. OWNER accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents, or

B. All Bids are rejected by OWNER, or

C. OWNER fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by paragraph 5.01 hereof).

4.01 Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from OWNER, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5.01 Surety waives notice of and any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by OWNER and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6.01 No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in paragraph 4.01 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7.01 Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8.01 Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9.01 Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent or representative, who executed this Bond on behalf of Surety to execute, seal and deliver such Bond and bind the Surety thereby.

10.01 This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11.01 The term "Bid" as used herein includes a Bid, offer or proposal as applicable.

END OF BID BOND

SECTION 2875 OF THE PUBLIC AUTHORITIES LAW

§2875. GROUND FOR CANCELLATION OF CONTRACT BY PUBLIC AUTHORITY.

A clause shall be inserted in all specifications or contracts hereafter made or awarded by any public authority or by any official of any public authority created by the state or any political subdivision, for work or services performed or to be performed or goods sold or to be sold, to provide that upon the refusal of a person, when called before a grand jury, head of a state department, temporary state commission, or other state agency, the organized crime task force in the department of law, head of a city department, or other city agency, which is empowered to compel the attendance of witnesses and examine them under oath, to testify in an investigation concerning any transaction or contract had with the state, any political subdivision thereof or of a public authority, to sign a waiver of immunity against subsequent criminal prosecution or to answer any relevant question concerning such transaction or contract.

(a) Such person, and any firm, partnership or corporation of which he is a member, partner, director or officer shall be disqualified from thereafter selling to or submitting bids to or receiving awards from or entering into any contracts with any public authority or official thereof, for goods, work or services, for a period of five years after such refusal, and to provide also that;

(b) any and all contracts made with any public authority or official thereof, since the effective date of this law, by such person and by any firm, partnership or corporation of which he is a member, partner, director or officer may be canceled or terminated by the public authority without incurring any penalty or damages on account of such cancellation or termination, but any monies owing by the public authority for goods delivered or work done prior to the cancellation termination shall be paid.

This is to CERTIFY that neither the undersigned nor any member, partner, director, or officer of the firm has refused to sign a waiver of immunity against subsequent criminal prosecution or to answer any relevant question concerning a transaction or contract with the state, any political subdivision thereof, a public authority or with a public department, agency or official of the state or of any political subdivision thereof or of a public authority, when called before a grand jury, head of a state department, temporary state commission, or other state agency, the organized crime task force in the department of law, head of a city department, or other city agency, which is empowered to compel the attendance of witnesses and examine them under oath.

_____
(Name of Individual, Partnership or Corporation)

By _____
(Person authorized to sign)

(SEAL)

SECTION 2876 OF THE PUBLIC AUTHORITIES LAW

§2876. DISQUALIFICATION TO CONTRACT WITH PUBLIC AUTHORITY

Any person who, when called before a grand jury, head of a state department, temporary state commission or other state agency, the organized crime task force in the department of law, head of a city department or other city agency, which is empowered to compel the attendance of witnesses and examine them under oath to testify in an investigation concerning any transaction or contract had with the state, any political subdivision thereof, a public authority or with a public department, agency or official of the state or of any political subdivision thereof or of a public authority, refuses to sign a waiver of immunity against subsequent criminal prosecution or to answer any relevant questions concerning such transaction or contract, and any firm, partnership or corporation of which he is a member, partner, director or officer shall be disqualified from thereafter selling to or submitting bids to or receiving awards from or entering into any contracts with any public authority or any official of any public authority created by the state or any political subdivision, for goods, work or services, for a period of five years after such refusal or until a disqualification shall be removed pursuant to the provisions of section twenty-six hundred three of this article.

It shall be the duty of the officer conducting the investigation before the grand jury, the head of a state department, the chairman of the temporary state commission or other state agency, the organized crime task force in the department of law, the head of a city department or other city agency before which the refusal occurs to send notice of such refusal, together with the names of any firm, partnership or corporation of which the person so refusing is known to be a member, partner, officer or director, to the commissioner of transportation of the state of New York, or the commissioner of general services as the case may be, and the appropriate departments, agencies and officials of the state, political subdivisions thereof or public authorities with whom the persons so refusing and any firm, partnership or corporation of which he is a member, partner, director or officer, is known to have a contract. However, when such refusal occurs before a body other than a grand jury, notice of refusal shall not be sent for a period of ten days after such refusal occurs. Prior to the expiration of this ten day period, any person, firm, partnership or corporation which has become liable to the cancellation or termination of a contract or disqualification to contract on account of such refusal may commence a special proceeding at a special term of the supreme court, held within the judicial district in which the refusal occurred, for an order determining whether the questions in response to which the refusal occurred were relevant and material to the inquiry. Upon the commencement of such proceeding, the sending of such notice of refusal to answer shall be subject to order of the court in which the proceeding was brought in a manner and on such terms as the court may deem just. If a proceeding is not brought within ten days, notice of refusal shall thereupon be sent as provided herein.

SECTION 2878 OF THE PUBLIC AUTHORITIES LAW

§2878. STATEMENT OF NON-COLLUSION IN BIDS OR PROPOSALS TO PUBLIC AUTHORITY.

(1) Every bid or proposal hereafter made to a public authority or to any official of any public authority created by the state or any political subdivision, where competitive bidding is required by statute, rule, regulation or local law, for work or services performed or to be performed or goods sold or to be sold, shall contain the following statement subscribed by the bidder and affirmed by such bidder as true under the penalties of perjury:

NON-COLLUSIVE BIDDING CERTIFICATION

(a) By submission of this bid, EACH BIDDER AND EACH PERSON SIGNING ON BEHALF OF ANY BIDDER CERTIFIES, AND IN THE CASE OF A JOINT BID EACH PARTY THERETO CERTIFIES AS TO ITS OWN ORGANIZATION, under penalty of perjury, that to the best of his knowledge and belief: (1) the prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor; (2) Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and (3) No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

(b) A bid shall not be considered for award nor shall any award be made where (a) (1) (2) and (3) above have not been complied with; provided, however, that if in any case the bidder cannot make the foregoing certification, the bidder shall so state and shall furnish with the bid a signed statement which sets forth in detail the reasons therefore. Where (a) (1) (2) and (3) above have not been complied with, the bid shall not be considered for award nor shall any award be made unless the head of the purchasing unit of the state, public department or agency to which the bid is made, or his designee, determines that such disclosure was not made for the purpose of restricting competition.

The fact that a bidder (a) has published price lists, rates, or tariffs covering items to be procured, (b) has informed prospective customers of proposed or pending publication of new or revised price lists for such items, or (c) has sold the same items to other customers at the same prices being bid, does not constitute, without more, a disclosure within the meaning of subparagraph one (a).

The undersigned CERTIFIES, under penalty of perjury, that he is authorized to make this bid and execute this statement of non-collusion; that each of the statements contained in (1), (2) and (3) of paragraph (a) are true; that he is familiar with the statements and restrictions contained in paragraph (b) and the paragraph regarding the publication of price lists, etc. and such statements and restrictions are true and have been complied with by the bidder.

_____

(Name of Individual, Partnership, or Corporation)

By _____

(SEAL)

FORMS A, B, and C

STATE FINANCE LAW REQUIREMENTS

The Erie County Water Authority (the "Authority") is a government entity, as that term is defined in State Finance Law §§ 139-j(1)(a) and 139-k(1)(a). When the Authority seeks to procure goods or services by means of an Invitation or Notice to Bid, or a Request for Proposals, the State Finance Law imposes certain restrictions on anyone who may wish to offer goods or services to the Authority as an Offerer, as that term is defined in §§ 139-j(1)(h) and 139-k(1)(h).

During the Restricted Period, as defined in §§ 139-j(1)(f) and 139-k(1)(f), when bids or proposals are being solicited, the Authority will designate a contact person with whom the Offerer may contact for information and other authorized purposes as set forth in §139-j of the State Finance Law. The designated contact is identified in the Notice to Bidders, or in the Request for Proposal. An Offerer is authorized to contact the Authority's designated contact for such purposes as set forth in § 139-j(3).

Pursuant to the State Finance Law, the Authority is also required to make certain findings before making any determinations as to the qualifications and eligibility of those seeking a procurement contract, as that term is defined in State Finance Law §§ 139-j(1)(g) and 139-k(1)(g). Certain findings of non-responsibility can result in rejection for contract award and in the event of two findings of non-responsibility occurring within a 4-year period, the Offerer will be debarred from obtaining procurement contracts with the Authority. Further information about these requirements can be found in §§139−j and 139−k of the New York State Finance Law and the Erie County Water Authority's Procurement Disclosure Policy.

The following forms will be used by the Authority to make such findings:

Form A - Offerer's Affirmation of Understanding of, and Agreement to Comply with, the Authority's Permissible Contact Requirements During the Restricted Period.

Form B - Offerer's Certification of Compliance with State Finance Law.

Form C - Offerer's Disclosure of Prior Non-Responsibility Determinations.

FORM A

Offerer's Affirmation of Understanding of, and Agreement to Comply with, the Permissible Contact Requirements During the Restricted Period

Instructions:

The Erie County Water Authority (the "Authority") is a government entity, as that term is defined in State Finance Law §§ 139-j(1)(a) and 139-k(1)(a). The Authority must obtain a written affirmation of understanding and agreement to comply with procedures regarding permissible contacts with the Authority in the restricted period for a procurement contract in accordance with State Finance Law §139−j and §139−k. It is required that this affirmation be obtained as early as possible in the procurement process, but no later than when the Offerer submits its proposal.

Offerer affirms that it understands and agrees to comply with the procedures of the Authority relative to permissible contacts as required by State Finance Law §139−j(3) and §139−j(6)(b).

By: _____ Date: _____

Name: _____

Title: _____

Contractor Name: _____

Contractor Address: _____

_____

_____

FORM B

Offerer's Certification of Compliance With State Finance Law §139−k(5)

Instructions:

The Erie County Water Authority (the "Authority") is a government entity, as that term is defined in State Finance Law §§ 139-j(1)(a) and 139-k(1)(a). The Authority must obtain a Certification that the information submitted for a procurement contract is complete, true, and accurate regarding any prior findings of non-responsibility, such as non-responsibility pursuant to State Finance Law §139−j. The Offerer must agree to sign the Certification, under penalty of perjury, and to provide the Certification to the Authority. The Certification should be obtained as early as possible in the process, but no later than when an Offerer submits its proposal.

Offerer Certification:

I certify that all information provided to the Authority relating to the awarding of a procurement contract is complete, true, and accurate.

By: _____ Date: _____

Name: _____

Title: _____

Contractor Name: _____

Contractor Address: _____

_____

_____

FORM C

Offerer's Disclosure of Prior Non-Responsibility Determinations

Background:

The Erie County Water Authority (the "Authority") is a government entity, as that term is defined in State Finance Law §§ 139-j(1)(a) and 139-k(1)(a). New York State Finance Law §139−k(2) obligates the Authority to obtain specific information regarding prior non-responsibility determinations with respect to State Finance Law §139−j. In accordance with State Finance Law §139−k, an Offerer must be asked to disclose whether there has been a finding of non-responsibility made within the previous four (4) years by any Governmental Entity due to: (a) a violation of State Finance Law §139−j; or (b) the intentional provision of false or incomplete information to a Government Entity.

The terms "Offerer" and "Governmental Entity" are defined in State Finance Law §§139−j(1). and §139−k(1), These sections also set forth detailed requirements about the restrictions on contacts during the procurement process. A violation of State Finance Law §139−j includes, but is not limited to, an impermissible contact during the restricted period (for example, contacting a person or entity other than the designated contact person, when such contact does not fall within one of the exemptions).

As part of its responsibility determination, State Finance Law §139−k(3) mandates consideration of whether an Offerer fails to timely disclose accurate or complete information regarding the above non-responsibility determination. In accordance with law, no Procurement Contract shall be awarded to any Offerer that fails to timely disclose accurate or complete information under this section, unless a finding is made that the award of the Procurement Contract to the Offerer is necessary to protect public property or public health safety, and the Offerer is the only source capable of supplying the required Article of Procurement, as that term is defined in State Finance Law §§ 139-j(1)(b) and 139-k(1)(b), within the necessary timeframe. See State Finance Law §139−j(10)(b) and §139−k(3).

Instructions:

The Authority must include a disclosure request regarding prior non-responsibility determinations in accordance with State Finance Law §139−k in its solicitation of proposals or bid documents or specifications or contract documents, as applicable, for procurement contracts. The attached form is to be completed and submitted by the individual or entity seeking to enter into a Procurement Contract. It shall be submitted to the Authority conducting the Governmental Procurement no later than when the Offerer submits its proposal.

FORM C (Continued)

Offerer's Disclosure of Prior Non-Responsibility Determinations

Name of Individual or Entity Seeking to Enter into the Procurement Contract:

_____

Address: _____

_____

Name and Title of Person Submitting this Form: _____

_____

Contract Procurement Number: _____

Date: _____

1. Has any Governmental Entity made a finding of non-responsibility regarding the individual or entity seeking to enter into the Procurement Contract in the previous four years? (Please circle): No Yes

   If yes, please answer the next questions:

2. Was the basis for the finding of non-responsibility due to a violation of State Finance Law §139−j (Please circle): No Yes

3. Was the basis for the finding of non-responsibility due to the intentional provision of false or incomplete information to a Governmental Entity? (Please circle) No Yes

4. If you answered yes to any of the above questions, please provide details regarding the finding of non-responsibility below.

Governmental Entity: _____

Date of Finding of Non-Responsibility: _____

Basis of Finding of Non-Responsibility: _____

_____

_____

_____

_____

_____

(Add additional pages as necessary)

FORM C (Continued)

5. Has any Governmental Entity or other governmental agency terminated or withheld a Procurement Contract with the above-named individual or entity due to the intentional provision of false or incomplete information? (Please circle): No Yes

6. If yes, please provide details below.
   Governmental Entity: _____

   Date of Termination or Withholding of Contract: _____

   Basis of Termination or Withholding:

   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____

   (Add additional pages as necessary)

Offerer certifies that all information provided to the Erie County Water Authority with respect to State Finance Law §139−k is complete, true, and accurate.

By: _____ Date: _____
Signature

Name: _____

Title: _____

CONTRACT TERMINATION PROVISION

Instructions:

A Contract Termination Provision will be included in each procurement contract governed by State Finance Law §139−k. New York State Finance Law §139-k(5) provides that every procurement contract award subject to the provisions of State Finance Law §§139−k and 139−j shall contain a provision authorizing the governmental entity to terminate the contract in the event that the certification is found to be intentionally false or intentionally incomplete. This statutory contract language authorizes, but does not mandate, termination. "Government Entity" and "procurement contract" are defined in State Finance Law §§ 139 j(1) and 139−k(l).

This required clause will be included in a covered procurement contract.

A sample of the Termination Provision is included below. If a contract is terminated in accordance with State Finance Law §139−k(5), the Erie County Water Authority, as a governmental entity, is required to include a statement in the procurement record describing the basis for any action taken under the termination provision.

Sample Contract Termination Provision

The Erie County Water Authority, as a governmental entity, reserves the right to terminate this contract in the event it is found that the certification filed by the Offerer in accordance with New York State Finance Law §139−k was intentionally false or intentionally incomplete. Upon such finding, the Authority may exercise its termination right by providing written notification to the Offerer in accordance with the written notification terms of this contract.

SECTION 139-L OF THE STATE FINANCE LAW
STATEMENT RELATING TO SEXUAL HARASSMENT POLICY

1. "Bidder" has the same meaning as the term, "Offerer," as that terms is defined in State Finance Law § 139-k(1)(h), and includes anyone who submits a bid or proposal.

2. Every proposal or bid hereafter made and submitted to the Erie County Water Authority, where competitive bidding or a sealed proposal is required by statute, rule or regulation, for work or services performed or to be performed or goods sold or to be sold, shall contain the following statement subscribed by the Bidder and affirmed by such Bidder as true under penalty of perjury:

SEXUAL HARASSMENT BIDDING CERTIFICATION

(a) "By submission of this bid/proposal, EACH BIDDER AND EACH PERSON SIGNING ON BEHALF OF ANY BIDDER CERTIFIES, AND IN THE CASE OF A JOINT BID EACH PARTY THERETO CERTIFIES AS TO ITS OWN ORGANIZATION, under penalty of perjury, that the Bidder has and has implemented a written policy addressing sexual harassment prevention in the workplace and provides annual sexual harassment prevention training to all its employees. Such policy shall, at a minimum, meet the requirements of Section two hundred one-g of the Labor Law."

3. A bid/proposal shall not be considered for award nor shall any award be made to a Bidder who has not complied with subdivision one of this section; provided, however, that if in any case the Bidder cannot make the foregoing certification, the Bidder shall so state and shall furnish with the bid/proposal a signed statement which sets forth in detail the reasons therefore.

The undersigned CERTIFIES, under penalty of perjury, that he is authorized to make this bid/proposal and execute this statement on sexual harassment; that he is familiar with the statements contained in ¶2(a) of this document, as well as the provisions of State Finance Law §139-L and Labor Law §201-g, and such statements are true and have been complied with by the Bidder.

_____
(Name of Individual, Partnership or Corporation)

By _____
(Person authorized to sign)

(SEAL)

END OF BID FORM SUPPLEMENTS

ERIE COUNTY WATER AUTHORITY
BUFFALO, NEW YORK

CONTRACT NO: GHD-07
WATER SYSTEM IMPROVEMENTS GUENTHER PUMP STATION REHABILITATION
PROJECT NO: 201800138

SECTION 00450

BIDDER'S QUALIFICATION STATEMENT

(Completion of this statement is required in advance of consideration for award of Contract.)

SUBMITTED TO:

Service Center Front Desk
Erie County Water Authority
3030 Union Road
Cheektowaga, New York 14227

SUBMITTED FOR:

Erie County Water Authority
Contract No: GHD-07
Water System Improvements, Guenther Pump Station Rehabilitation
ECWA Project No. 201800138

SUBMITTED BY:

Name of Organization: _____
(Print or Type Name of Bidder)

Name of Individual: _____

Title: _____

Business Address: _____

_____

Telephone No.: _____

Fax No.: _____

Gentlemen:

The undersigned certifies under oath the truth and correctness of all statements and of all answers to questions made hereinafter.

(Note: Attach additional sheets as required.)

1.0 Bidder's General Business Information

1.1 Check if:

□ Corporation □ Partnership □ Joint Venture □ Sole Proprietorship

If Corporation:

A. Date and State of Incorporation:

_____

_____

B. List of Executive Officers:

Name	Title

If Partnership:

A. Date and State of Organization:

_____

_____

B. Names of Current General Partners:

_____

_____

C. Type of Partnership

□ General □ Publicly Traded

□ Limited □ Other (described): _____

If Joint Venture:

A. Date and State of Organization:

_____

_____

B. Name, Address and Form of Organization of Joint Venture Partners: (Indicate managing partner by an asterisk *):

_____

_____

_____

_____

_____

If Sole Proprietorship:

A. Date and State of Organization:

_____

_____

B. Name and Address of Owner or Owners:

_____

_____

_____

_____

2.0 How many years has your organization been in business as a general contractor? _____

3.0 Has your organizational structure changed within the past five years? □ Yes □ No

If the answer to this question is "yes", provide data as listed above in Item 1.0 for your previous organization.

_____

_____

_____

_____

4.0 We normally perform _____ percent of the work with our own forces. List work normally subcontracted.

_____

_____

5.0 Has any construction contract to which you have been a party been terminated by the owner; have you ever terminated work on a project prior to its completion for any reason; has any surety which issued a performance bond on your behalf ever completed the work in its own name or financed such completion on your behalf; has any surety expended any monies in connection with a contract for which they furnished a bond on your behalf?

□ Yes □ No

If the answer to any portion of this question is "yes", furnish details of all such occurrences including name of owner, architect or engineer, and surety, and name and date of project.

_____

_____

_____

_____

6.0 Has any officer or partner of your organization ever been an officer or partner of another organization that had any construction contract terminated by the owner; terminated work on a project prior to its completion for any reason; had any surety which issued a performance bond complete the work in its own name or financed such completion; or had any surety expend any monies in connection with a contract for which they furnished a bond?

□ Yes □ No

If the answer to any portion of this question is "yes", furnish details of all such occurrences including name of owner, architect or engineer, and surety, and name and date of project.

_____

_____

_____

_____

7.0 In the last five years, has your organization, or any predecessor organization, failed to substantially complete a project in a timely manner?

□ Yes □ No

If the answer to this question is "yes", furnish details of all such occurrences including name of owner, architect or engineer, and surety, and name and date of project.

_____

_____

_____

_____

8.0 On Schedule A, attached, list name, location and description of project, owner, architect or engineer, contract price, percent complete and scheduled completion of the major construction projects your organization has in progress on this date. Provide name, address and telephone number of a reference for each project listed.

9.0 On Schedule B, attached, list name, location and description of project, owner, architect or engineer, contract price, date of completion and percent of work with your own forces of major projects of the same general nature as this project which your organization has completed in the past five years. Provide name, address and telephone number of a reference for each project listed.

10.0 On Schedule C, attached, list name and construction experience of the principal individuals of your organization directly involved in construction operations.

10.1 On Schedule D, attached, list OSHA Information requested.

11.0 List the states and categories of construction in which your organization is legally qualified to do business.

_____

_____

12.0 Provide the following for your surety:

12.1 Surety Company: _____

12.2 Agent: _____

A. Address: _____

B. Telephone No.: _____

12.3 What is your approximate total bonding capacity?

□ $500,000 to $2,000,000
□ $2,000,000 to $5,000,000
□ $5,000,000 to $10,000,000
□ $10,000,000 or more

13.0 Provide the following with respect to an accredited banking institution familiar with your organization.

13.1 Name of Bank: _____

13.2 Address: _____

13.3 Account Manager: _____

13.4 Telephone No.: _____

14.0 Provide the name, address and telephone number of an individual who represents a major equipment/material supplier whom the Owner may contact for a financial reference:

_____

_____

15.0 Attach a financial statement, prepared on an accrual basis, in a form which clearly indicates Bidder's assets, liabilities and net worth.

15.1 Date of financial statement: _____

15.2 Name of firm preparing statement: _____

16.0 Dated at _____, this _____ day of _____, 20_____.

Bidder: _____
(Print or Type Name of Bidder)

By: _____

_____

Title: _____

Attachments A, B, C, and D

(Seal, if corporation)

----------(Affidavit for Individual)----------

_____ being duly sworn, deposes and says that:
a) the financial statement, taken from his/her books, is a true and accurate statement of his/her financial condition as of the date thereof; and b) all of the foregoing qualification information is true, complete, and accurate.

----------(Affidavit for Partnership)----------

_____ being duly sworn, deposes and says that:
a) he/she is a member of the partnership of _____;
b) he/she is familiar with the books of said partnership showing its financial condition; c) the financial statement, taken from the books of said partnership, is a true and accurate statement of the financial condition of the partnership as of the date thereof; and d) all of the foregoing qualification information is true, complete, and accurate.

----------(Affidavit for Corporation)----------

_____ being duly sworn, deposes and says that:
a) he/she is _____ of _____;
(Full name of Corporation)
b) he/she is familiar with the books of said corporation showing its financial condition; c) the financial statement, taken from the books of said corporation, is a true and accurate statement of the financial condition of said corporation as of the date thereof; and d) that all of the foregoing qualification information is true, complete, and accurate.

----------(Acknowledgment)----------

_____ being duly sworn, deposes and says
that he/she is _____ of _____;
(Name of Bidder)
that he/she is duly authorized to make the foregoing affidavit and that he/she makes it on behalf of ( ) himself/herself; ( ) said partnership; ( ) said corporation.

Sworn to before me this _____ day of _____, 20_____, in the County of _____, State of _____.

_____
(Notary Public)

My commission expires _____

(Seal)

END OF BIDDER QUALIFICATIONS STATEMENT

ATTACHMENT A

SCHEDULE A
PROJECTS IN PROGRESS

Name, Location and Description of Project	Owner	Architect or Engineer	Contract Price	Percent Complete	Scheduled Completion	Reference/Contract Include Address and Phone

ATTACHMENT B

SCHEDULE B
PROJECTS COMPLETED

Name, Location and Description of Project	Owner	Architect or Engineer	Date Completed	Contract Price	Percent with Own Forces	Reference/Contract Include Address and Phone

ATTACHMENT C

SCHEDULE C
PERSONNEL

Name	Position	Date Started With This Organization	Date Started In Construction	Prior Positions and Experience In Construction

ATTACHMENT D

SCHEDULE D
OSHA INFORMATION

List all Occupational Safety and Health Administration Citations for the last three years, including date, subject matter, and penalty.

Attach copies of all determined Citations and Notification of Penalty, Form OSHA 2.

Describe all pending cases, giving pertinent information such as apparent violations, location of project, type of project, and present status.

List any additional information on the back or attach a separate sheet if necessary.

EXPERIENCE IN THE INSTALLATION OF
TAPPING SADDLES & VALVES
ON
PRESTRESSED CONCRETE CYLINDER PIPE

When this Contract includes the Installation of Tapping Saddles and Valves on Prestressed Concrete Cylinder Pipe, the Bidder is required to complete one of the following to the satisfaction of the ENGINEER:

A. I have had experience* in the above as follows:

1. _____

2. _____

3. _____

B. The above noted work will be done by a subcontractor

_____

Who has the following experience*:

1. _____

2. _____

3. _____

C. I will have a representative of a manufacturer of prestressed concrete cylinder pipe

_____ do the above noted work.
(Insert manufacturer's name)

* List size and type (SP-5 or SP-12) of main tapped along with location, year and who the work was done for.

ERIE COUNTY WATER AUTHORITY
BUFFALO, NEW YORK

CONTRACT NO: GHD-07
WATER SYSTEM IMPROVEMENTS GUENTHER PUMP STATION REHABILITATION
PROJECT NO: 201800138

SECTION 00500

AGREEMENT

THIS AGREEMENT is dated as of the _____ day of _____ in the year _____, by and between the ERIE COUNTY WATER AUTHORITY (hereinafter called OWNER) and _____ (hereinafter called CONTRACTOR).

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

ARTICLE 1 - WORK

1.01 CONTRACTOR shall at its own cost and expense furnish all labor, services, tools, materials, equipment and incidentals necessary to complete all Work as specified or indicated in the Contract Documents to perform all specified work required for the rehabilitation of the Guenther Pump Station on Pleasant Avenue in Hamburg, NY. The Work includes all road cuts, valves, pump and piping modifications, restoration, and all related work as shown on the drawings and described in the specifications. The Work is generally described in Section 01100 of the General Requirements.

ARTICLE 2 - ENGINEER

2.01 The Project has been designed by GHD Consulting Services Inc., 285 Delaware Ave. Suite 500. Buffalo, NY who is hereinafter called the ENGINEER. GHD will assume all duties and responsibilities and have the rights and authority assigned to ENGINEER in connection with completion of the Work in accordance with the Contract Documents.

ARTICLE 3 - CONTRACT TIMES

3.01 Time of the Essence

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

3.02 Days to Achieve Substantial Completion and Final Payment

A. The Work shall be substantially completed within (660) days after the date when the Contract Times commence to run as provided in Paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with paragraph 14.07 of the General Conditions within (720) days from the date when the Contract Times commence to run.

ARTICLE 4 - LIQUIDATED AND SPECIAL DAMAGES

4.01 Liquidated Damages

A. OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and OWNER will suffer financial loss, apart from the costs described in paragraph 4.02.A, if the Work is not substantially completed within the time specified in Article 3 for Substantial Completion, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. OWNER and CONTRACTOR 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 substantially completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER ($500) for each day that expires after the time specified in Article 3 for Substantial Completion (adjusted for any changes thereof made in accordance with Article 12 of the General Conditions) until the Work is substantially complete.

4.02 Special Damages:

A. In addition to the amount provided for liquidated damages, CONTRACTOR shall pay OWNER the actual costs reasonably incurred by OWNER for engineering and inspection forces employed for the Work for each day that expires after the days specified in Article 3 for Substantial Completion (adjusted for any changes thereof made in accordance with Article 12 of the General Conditions) until the Work is substantially complete.

B. After Substantial Completion, if CONTRACTOR shall neglect, refuse or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER the actual costs reasonably incurred by OWNER for engineering and inspection forces employed for the Work for each day that expires after the time specified in Article 3 for Work to be completed and ready for final payment (adjusted for any extensions thereof made in accordance with Article 12 of the General Conditions) until the Work is completed and ready for final payment.

4.03 OWNER may deduct liquidated damages and special damages as determined by the provisions of this Article 4 from progress payments due CONTRACTOR under this Agreement.

ARTICLE 5 - CONTRACT PRICE

5.01 OWNER shall pay CONTRACTOR, in current funds, for completion of the Work in accordance with the Contract Documents the prices stated in CONTRACTOR'S Bid, which Bid is attached hereto and identified as Exhibit 1 of this Agreement. As provided in paragraph 11.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by ENGINEER as provided in paragraph 9.08 of the General Conditions. Unit prices have been computed as provided in paragraph 11.03 of the General Conditions.

ARTICLE 6 - PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

A. CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed as provided in the General Conditions.

6.02 Progress Payments; Retainage

A. OWNER shall make monthly progress payments on account of the Contract Price on the basis of CONTRACTOR'S Applications for Payment as recommended by ENGINEER. CONTRACTOR'S Applications for Payment will be due on the last day of the month. All progress payments will be on the basis of the progress of the Work measured by the schedule of values provided for in paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work, based on the number of units completed and accepted) or, in the event there is no schedule of values, as provided in the General Requirements. A progress payment will not be made whenever the value of the Work completed since the last previous progress payment is less than ten thousand dollars ($10,000).

1. Prior to Substantial Completion

a. Progress payments will be made in the amount of 95 percent of the Work completed, (with the balance being retainage), less the aggregate of payments previously made and less such amounts as ENGINEER shall determine, or OWNER may withhold, in accordance with paragraph 14.02 of the General Conditions; and

b. 95 percent of the cost of materials and equipment not incorporated in the Work but suitably stored (with the balance being retainage).

2. Upon Substantial Completion, OWNER shall pay an amount sufficient to increase total payments to CONTRACTOR to 100 percent of the Work completed, less such amounts as ENGINEER shall determine in accordance with paragraph 14.02.B.5 of the General Conditions and less 200 percent of ENGINEER'S estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

6.03 Final Payment:

A. Upon final completion and acceptance of the Work in accordance with paragraph 14.07 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said paragraph 14.07.

ARTICLE 7 - INTEREST

7.01 All moneys not paid when due hereunder shall bear interest at the maximum rate allowed by law at the place of the Project.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.01 As part of the inducement for OWNER to enter into this Agreement CONTRACTOR makes the following representations:

A. CONTRACTOR has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. CONTRACTOR has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance for the Work.

C. CONTRACTOR is familiar with and is satisfied as to all federal, state and local 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 contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions, and (2) reports and drawings of a Hazardous Environmental Condition identified at the Site, if any, which have been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions.

E. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or

contiguous to the Site which may affect cost, progress or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents to be employed by CONTRACTOR, and safety precautions and programs incident thereto.

F. CONTRACTOR does not consider that any 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 Documents.

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 correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.

I. 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.

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

ARTICLE 9 - CONTRACT DOCUMENTS

9.01 The Contract Documents consist of the following:

A. This Agreement ((9) pages).

B. Performance Bond ((2) pages).

C. Payment Bond ((2) pages).

D. General Conditions ((42) pages).

E. Supplementary Conditions ((10) pages).

F. Specifications, as listed in the table of contents of the Project Manual.

G. Appendix A - Women and Minority Business Enterprise Policy.

H. Appendix B - Insurance Requirements.

I. Appendix C - Prevailing Wage Rate Schedule.

J. Appendix D – Asbestos and Lead Survey Report

K. Appendix E – Geotechnical Report

L. Appendix F – Pump Station Control Panel Drawings

M. The Drawings comprising a set entitled: Contract No: GHD-07, Water System Improvements, Guenther Pump Station and including:

N. Addenda consisting of Numbers____ to ____, inclusive.

O. Exhibits to the Agreement enumerated as follows:

1. Exhibit 1, Bid Form ((10) pages).

P. The following, which may be delivered or issued on or after the Effective Date of the Agreement, and are not attached hereto:

1. Notice to Proceed
2. Written Amendments
3. Work Change Directives
4. Change Order(s)

9.02 The documents listed in paragraph 9.01 above are attached to this Agreement (except as expressly noted otherwise above). Documents not attached are incorporated by reference. There are no Contract Documents other than those listed in this Article 9.

9.03 The Contract Documents may only be amended, modified or supplemented as provided in paragraph 3.04 of the General Conditions.

ARTICLE 10 - MISCELLANEOUS

10.01 Terms

A. Terms used in this Agreement will have the meanings indicated in the General Conditions.

10.02 Assignment of Contract

A. 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, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no

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

10.03 Successors and Assigns

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

10.04 Severability

A. Any provision or part of the Contract Document, 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 Waiver

A. The waiver by the OWNER of any breach or violation of any term, covenant, or condition of this Agreement or of any Law or Regulation shall not be deemed to be a waiver of any other term, covenant, condition, or Law or Regulation or of any subsequent breach or violation of the same or of any other term, covenant, condition, or Law or Regulation. The subsequent payment of any monies or fee by the OWNER which may become due hereunder shall not be deemed to be a waiver of any preceding breach or violation by CONTRACTOR of any term, covenant, condition of this Agreement or of any applicable Law or Regulation.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on the day and year first written above.

This Agreement will be effective on _____, 20_____.

OWNER: Erie County Water Authority	CONTRACTOR: _____
By: _____	By: _____
Title: _____	Title: _____
[CORPORATE SEAL]	[CORPORATE SEAL]
Attest _____	Attest _____
Address for giving notices	Address for giving notices
_____	_____
_____	_____
(If OWNER is a corporation, partnership, or limited liability company, attach evidence of authority to sign) (If OWNER is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of Agreement.)	License No. _____ (where applicable) Agent for service of process: _____ _____ (If CONTRACTOR is a corporation, partnership, or limited liability company, attach evidence of authority to sign.)

Designated Representative:	Designated Representative:
Name: _____	Name: _____
Title: _____	Title: _____
Address: _____	Address: _____
Phone No.: _____	Phone No.: _____
Fax No.: _____	Fax No.: _____

END OF AGREEMENT

Performance Bond

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

Erie County Water Authority
295 Main Street, Room 350
Buffalo New York 14203

CONTRACT
Date:
Amount:
Description: ERIE COUNTY WATER AUTHORITY
CONTRACT NO: GHD-07
WATER SYSTEM IMPROVEMENTS,
GUENTHER PUMP STATION REHABILITATION
PROJECT No. 201800138

BOND
Date (Not earlier than Contract Date):
Amount:
Modifications to this Bond Form:

Surety and CONTRACTOR, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent or representative.

CONTRACTOR AS PRINCIPAL		SURETY	
Company:	(Corp. Seal)	Company:	(Corp. Seal)
Signature: _____		Signature: _____	
Name and Title:		Name and Title: (Attach Power of Attorney)	

(Space is provided below for signatures of additional parties, if required.)

CONTRACTOR AS PRINCIPAL		SURETY	
Company:	(Corp. Seal)	Company:	(Corp. Seal)
Signature: _____		Signature: _____	
Name and Title:		Name and Title:	

EJCDC No. 1910-28-A (1996 Edition)
Originally prepared through the joint efforts of the Surety Association of America, Engineers Joint Contract Documents Committee, the Associated General Contractors of America, and the American Institute of Architects.

1. The CONTRACTOR and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the OWNER for the performance of the Contract, which is incorporated herein by reference.

2. If the CONTRACTOR performs the Contract, the Surety and the CONTRACTOR have no obligation under this Bond, except to participate in conferences as provided in paragraph 3.1.

3. If there is no OWNER Default, the Surety's obligation under this Bond shall arise after:

3.1. The OWNER has notified the CONTRACTOR and the Surety at the addresses described in paragraph 10 below, that the OWNER is considering declaring a CONTRACTOR Default and has requested and attempted to arrange a conference with the CONTRACTOR and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Contract. If the OWNER, the CONTRACTOR and the Surety agree, the CONTRACTOR shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive the OWNER'S right, if any, subsequently to declare a CONTRACTOR Default; and

3.2. The OWNER has declared a CONTRACTOR Default and formally terminated the CONTRACTOR'S right to complete the Contract. Such CONTRACTOR Default shall not be declared earlier than twenty days after the CONTRACTOR and the Surety have received notice as provided in paragraph 3.1; and

3.3. The OWNER has agreed to pay the Balance of the Contract Price to:

3.3.1. The Surety in accordance with the terms of the Contract; or

3.3.2 Another contractor selected pursuant to paragraph 4.3 to perform the Contract.

4. When the OWNER has satisfied the conditions of paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

4.1. Arrange for the CONTRACTOR, with consent of the OWNER, to perform and complete the Contract; or

4.2. Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or

4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the OWNER for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by the OWNER and the contractor selected with the OWNER'S concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the Bonds issued on the Contract, and pay to the OWNER the amount of damages as described in paragraph 6 in excess of the Balance of the Contract Price incurred by the OWNER resulting from the CONTRACTOR Default; or

4.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances;

4.4.1 After investigation, determine the amount for which it may be liable to the OWNER and, as soon as practicable after the amount is determined, tender payment therefor to the OWNER; or

4.4.2 Deny liability in whole or in part and notify the OWNER citing reasons therefor.

5. If the Surety does not proceed as provided in paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the OWNER to the Surety demanding that the Surety perform its obligations under this Bond, and the OWNER shall be entitled to enforce any remedy available to the OWNER. If the Surety proceeds as provided in paragraph 4.4, and the OWNER refuses the payment tendered or the Surety has denied pliability, in whole or in part, without further notice the OWNER shall be entitled to enforce any remedy available to the OWNER.

6. After the OWNER has terminated the CONTRACTOR'S right to complete the Contract, and if the Surety elects to act under paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the OWNER shall not be greater than those of the CONTRACTOR under the Contract, and the responsibilities of the OWNER to the Surety shall not be greater than those of the OWNER under the Contract. To a limit of the amount of this Bond, but subject to commitment by the OWNER of the Balance of the Contract Price to mitigation of costs and damages on the Contract, the Surety is obligated without duplication for:

6.1. The responsibilities of the CONTRACTOR for correction of defective Work and completion of the Contract;

6.2. Additional legal, design professional and delay costs resulting from the CONTRACTOR'S Default, and resulting from the actions or failure to act of the Surety under paragraph 4; and

6.3. Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of the CONTRACTOR.

7. The Surety shall not be liable to the OWNER or others for obligations of the CONTRACTOR that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the OWNER or its heirs, executors, administrators, or successors.

8. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders and other obligations.

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and shall be instituted within two years after CONTRACTOR Default or within two years after the CONTRACTOR ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to the Surety, the OWNER or the CONTRACTOR shall be mailed or delivered to the address shown on the signature page.

11. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the Contract was be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here-from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

12. Definitions.

12.1 Balance of the Contract Price: The total amount payable by the OWNER to the CONTRACTOR under the Contract after all proper adjustments have been made, including allowance to the CONTRACTOR of any amounts received or to be received by the OWNER in settlement of insurance or other Claims for damages to which the CONTRACTOR is entitled, reduced by all valid and proper payments made to or on behalf of the CONTRACTOR under the Contract.

12.2. Contract: The agreement between the OWNER and the CONTRACTOR identified on the signature page, including all Contract Documents and changes thereto.

12.3. CONTRACTOR Default: Failure of the CONTRACTOR, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.

12.4. OWNER Default: Failure of the OWNER, which has neither been remedied nor waived, to pay the CONTRACTOR as required by the Contract or to perform and complete or comply with the other terms thereof.

(FOR INFORMATION ONLY - Name, Address and Telephone)
AGENT or BROKER: OWNER'S REPRESENTATIVE (Engineer):

Payment Bond

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

Erie County Water Authority
295 Main Street, Room 350
Buffalo New York 14203

CONTRACT
Date:
Amount:
Description: ERIE COUNTY WATER AUTHORITY
CONTRACT NO: GHD-07
WATER SYSTEM IMPROVEMENTS,
GUENTHER PUMP STATION REHABILITATION
PROJECT No. 201800138

BOND
Date (Not earlier than Contract Date):
Amount:
Modifications to this Bond Form:

Surety and CONTRACTOR, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent or representative.

CONTRACTOR AS PRINCIPAL
Company: (Corp. Seal)

Signature: _____
Name and Title:

SURETY
Company: (Corp. Seal)

Signature: _____
Name and Title:
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

CONTRACTOR AS PRINCIPAL
Company: (Corp. Seal)

Signature: _____
Name and Title:

SURETY
Company: (Corp. Seal)

Signature: _____
Name and Title:

EJCDC No. 1910-28-B (1996 Edition)
Originally prepared through the joint efforts of the Surety Association of America, Engineers Joint Contract Documents Committee, the Associated General Contractors of America, the American Institute of Architects, the American Subcontractors Association, and the Associated Specialty Contractors.

1. The CONTRACTOR and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the OWNER to pay for labor, materials and equipment furnished for use in the performance of the Contract, which is incorporated herein by reference.

2. With respect to the OWNER, this obligation shall be null and void if the CONTRACTOR:

2.1. Promptly makes payment, directly or indirectly, for all sums due Claimants, and

2.2. Defends, indemnifies and holds harmless the OWNER from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Contract, provided the OWNER has promptly notified the CONTRACTOR and the Surety (at the addresses described in paragraph 12) of any claims, demands, liens or suits and tendered defense of such claims, demands, liens or suits to the CONTRACTOR and the Surety, and provided there is no OWNER Default

3. With respect to Claimants, this obligation shall be null and void if the CONTRACTOR promptly makes payment, directly or indirectly, for all sums due.

4. The Surety shall have no obligation to Claimants under this Bond until:

4.1. Claimants who are employed by or have a direct contract with the CONTRACTOR have given notice to the Surety (at the addresses described in paragraph 12) and sent a copy, or notice thereof, to the OWNER, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2. Claimants who do not have a direct contract with the CONTRACTOR:

4.2.1 Have furnished written notice to the CONTRACTOR and sent a copy, or notice thereof, to the OWNER, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and

4.2.2 Have either received a rejection in whole or in part from the CONTRACTOR, or not received within 30 days of furnishing the above notice any communication from the CONTRACTOR by which the CONTRACTOR had indicated the claim will be paid directly or indirectly; and

4.2.3 Not having been paid within the above 30 days, have sent a written notice to the Surety and sent a copy, or notice thereof, to the OWNER, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the CONTRACTOR.

5. If a notice required by paragraph 4 is given by the OWNER to the CONTRACTOR or to the Surety, that is sufficient compliance.
6. When the Claimant has satisfied the conditions of paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:

6.1. Send an answer to the Claimant, with a copy to the OWNER, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.

6.2. Pay or arrange for payment of any undisputed amounts.

7. The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

8. Amounts owed by the OWNER to the CONTRACTOR under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any Performance Bond. By the CONTRACTOR furnishing and the OWNER accepting this Bond, they agree that all funds earned by the CONTRACTOR in the performance of the Contract are dedicated to satisfy obligations of the CONTRACTOR and the Surety under this Bond, subject to the OWNER'S priority to use the funds for the completion of the Work.

9. The Surety shall not be liable to the OWNER, Claimants or others for obligations of the CONTRACTOR that are unrelated to the Contract. The OWNER shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related Subcontracts, purchase orders and other obligations.

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by paragraph 4.1 or paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the OWNER or the CONTRACTOR shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, the OWNER or the CONTRACTOR, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is, that this Bond shall be construed as a statutory Bond and not as a common law bond.

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, the CONTRACTOR shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. DEFINITIONS

15.1 Claimant: An individual or entity having a direct contract with the CONTRACTOR or with a Subcontractor of the CONTRACTOR to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of the CONTRACTOR and the CONTRACTOR'S Subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

15.2 Contract: The agreement between the OWNER and the CONTRACTOR identified on the signature page, including all Contract Documents and changes thereto.

15.3 OWNER Default: Failure of the OWNER, which has neither been remedied nor waived, to pay the CONTRACTOR as required by the Contract or to perform and complete or comply with the other terms thereof.

(FOR INFORMATION ONLY - Name, Address and Telephone)
AGENT or BROKER: OWNER'S REPRESENTATIVE (Engineer):

ERIE COUNTY WATER AUTHORITY
BUFFALO, NEW YORK

CONTRACT NO: GHD-07
WATER SYSTEM IMPROVEMENTS
GUENTHER PUMP STATION REHABILITATION
PROJECT NO: 201800138

SECTION 00700

GENERAL CONDITIONS

Adapted with permission from Standard General Conditions of the Construction Contract, EJCDC No. 1910-8 (1996 Edition).

[This page was left blank intentionally.]

TABLE OF CONTENTS

Page

Page

TABLE OF CONTENTS (CONTINUED)

Page

[This page was left blank intentionally.]

GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Contract Documents and printed with initial or all capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof.

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

2. *Agreement*--The written instrument which is evidence of the agreement between OWNER and CONTRACTOR covering the Work.

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. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*--The offer or proposal of a bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

7. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, Bid security form, if any, and the Bid form with any supplements.

8. *Bonds*--Performance and payment bonds and other instruments of security.

9. *Change Order*--A document recommended by ENGINEER 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, issued on or after the Effective Date of the Agreement.

10. *Claim*--A demand or assertion by OWNER or CONTRACTOR seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the OWNER and CONTRACTOR concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*--The Contract Documents establish the rights and obligations of the parties and include the Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR'S Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders, and ENGINEER'S written interpretations and clarifications issued on or after the Effective Date of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract Documents. Only printed or hard copies of the items listed in this paragraph are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by OWNER to CONTRACTOR are not Contract Documents.

13. *Contract Price*--The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Substantial Completion; and (ii) complete the Work so that it is ready for final payment as evidenced by ENGINEER'S written recommendation of final payment.

15. *CONTRACTOR*--The individual or entity with whom OWNER has entered into the Agreement.

16. *Cost of the Work*--See paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by ENGINEER which graphically shows the scope, extent, and character of the Work to be performed by CONTRACTOR. Shop Drawings and other CONTRACTOR submittals are not Drawings as so defined.

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

19. *ENGINEER*--The individual or entity named as such in the Agreement.

20. *ENGINEER'S Consultant*--An individual or entity having a contract with ENGINEER to furnish services as ENGINEER'S independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

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

22. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

23. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

24. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

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

26. *Liens*--Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

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

28. *Notice of Award*--The written notice by OWNER to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, OWNER will sign and deliver the Agreement.

29. *Notice to Proceed*--A written notice given 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 under the Contract Documents.

30. *OWNER*--The individual, entity, public body, or authority with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be performed.

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

32. *PCBs*--Polychlorinated biphenyls.

33. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

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

35. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

36. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

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

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

39. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.

40. *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 for access thereto, and such other lands furnished by OWNER which are designated for the use of CONTRACTOR.

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

42. *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 at the Site.

43. *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.

44. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

45. *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 any Subcontractor.

46. *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 those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

47. *Unit Price Work*--Work to be paid for on the basis of unit prices.

48. *Work*--The entire completed 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, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

49. *Work Change Directive*--A written statement to CONTRACTOR issued on or after the Effective Date of the Agreement and signed by OWNER and recommended by ENGINEER ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

50. *Written Amendment*--A written statement modifying the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the non-engineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

1.02 *Terminology*

A. *Intent of Certain Terms or Adjectives*

1. Whenever in the Contract Documents the terms "as ordered," "as directed," "as required," "as allowed," "as approved," or terms of like effect or import are used to authorize an exercise of professional judgment by the ENGINEER, or 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 completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to ENGINEER any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.10 or any other provision of the Contract Documents.

B. *Day*

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

C. *Defective*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it does not conform to the Contract Documents or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or has been damaged prior to ENGINEER'S recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with paragraph 14.04 or 14.05).

D. *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. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of CONTRACTOR, "provide" is implied.

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

ARTICLE 2 - PRELIMINARY MATTERS

2.01 *Delivery of Bonds*

A. When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish.

2.02 *Copies of Documents*

A. OWNER shall furnish to CONTRACTOR up to ten copies of the Contract Documents. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *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 Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract 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 Agreement, whichever date is earlier.

2.04 *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 the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *CONTRACTOR'S Review of Contract Documents:* Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error, ambiguity, or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby; however, 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 knew or reasonably should have known thereof.

B. *Preliminary Schedules:* Within ten days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), CONTRACTOR shall submit to ENGINEER for its 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 Documents;

2. a preliminary schedule of Shop Drawing and Sample submittals which will list each required submittal and the times for submitting, reviewing, and processing such submittal; 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.

C. *Evidence of Insurance:* Before any Work at the Site is started, CONTRACTOR and OWNER shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which CONTRACTOR and OWNER respectively are required to purchase and maintain in accordance with Article 5.

2.06 *Preconstruction Conference*

A. Within 20 days after the Contract Times start to run, but before any Work at the Site is started, a conference attended by 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 2.05.B, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 *Initial Acceptance of Schedules*

A. Unless otherwise provided in the Contract Documents, at least ten 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 2.05.B. CONTRACTOR shall have an additional ten 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 any specified Milestones and 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 Shop Drawing and Sample 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 component parts of the Work.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is called for by one is as binding as if called for 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. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to OWNER.

C. Clarifications and interpretations of the Contract Documents shall be issued by ENGINEER as provided in Article 9.

3.02 *Reference Standards*

A. *Standards, Specifications, Codes, Laws, and Regulations*

1. Reference to standards, specifications, manuals, 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, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual 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 Contract Documents, nor shall any such provision or instruction be effective to assign to OWNER, ENGINEER, or any of ENGINEER'S Consultants, agents, or employees any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, CONTRACTOR shall report it to ENGINEER in writing at once. CONTRACTOR shall not proceed with the Work affected thereby (except in an emergency as required by paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.04; provided, however, that CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any such conflict, error, ambiguity, or discrepancy unless CONTRACTOR knew or reasonably should have known thereof.

B. *Resolving Discrepancies*

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

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

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways: (i) a Written Amendment; (ii) a Change Order; or (iii) a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the

following ways: (i) a Field Order; (ii) ENGINEER'S approval of a Shop Drawing or Sample; or (iii) ENGINEER'S written interpretation or clarification.

3.05 *Reuse of Documents*

A. CONTRACTOR and any Subcontractor or Supplier or other individual or entity performing or furnishing any of the Work under a direct or indirect contract with OWNER: (i) shall not 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 ENGINEER'S Consultant, including electronic media editions; and (ii) shall not reuse any of 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 adaption by ENGINEER. This prohibition will survive final payment, completion, and acceptance of the Work, or termination or completion of the Contract. Nothing herein shall preclude CONTRACTOR from retaining copies of the Contract Documents for record purposes.

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

4.01 *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. OWNER will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If CONTRACTOR and OWNER are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in OWNER'S furnishing the Site, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

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

4.02 *Subsurface and Physical Conditions*

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

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that ENGINEER has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that ENGNEER has used in preparing the Contract Documents.

B. *Limited Reliance by CONTRACTOR on Technical Data Authorized:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER, or any of ENGINEER'S Consultants with respect to:

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

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

3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If CONTRACTOR believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed 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 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; 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 6.16.A), notify OWNER and ENGINEER in writing about such condition. CONTRACTOR shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *ENGINEER'S Review:* After receipt of written notice as required by paragraph 4.03.A, ENGINEER will promptly review the pertinent condition, determine the necessity of OWNER'S obtaining additional exploration or tests with respect thereto, and advise OWNER in writing (with a copy to CONTRACTOR) of ENGINEER'S findings and conclusions.

C. *Possible Price and Times Adjustments*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition 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 meet any one or more of the categories described in paragraph 4.03.A; and

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 paragraphs 9.08 and 11.03.

2. CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. CONTRACTOR knew of the existence of such conditions at the time CONTRACTOR made a final commitment to OWNER in respect of Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

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

c. CONTRACTOR failed to give the written notice within the time and as required by paragraph 4.03.A.

3. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in paragraph 10.05. However, OWNER, ENGINEER, and ENGINEER'S Consultants shall not be liable to CONTRACTOR for any claims, costs, losses, or 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) sustained by CONTRACTOR on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous 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 shall not be responsible for the accuracy or completeness of any such information or data; 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 such information and data,

b. locating all Underground Facilities shown or indicated in the Contract Documents,

c. coordination of the Work with the owners of such Underground Facilities, including OWNER, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents, CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, CONTRACTOR shall be responsible for the safety and protection of the underground facility.

2. If ENGINEER concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown with reasonable accuracy in the Contract Documents and that CONTRACTOR did not know of and could not reasonably have been expected to be aware of or to have anticipated. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, OWNER or CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

4.05 *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.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings*: Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the ENGINEER in the preparation of the Contract Documents.

B. *Limited Reliance by CONTRACTOR on Technical Data Authorized*: CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER or any of ENGINEER'S Consultants with respect to:

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

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

3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. CONTRACTOR shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. CONTRACTOR shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by CONTRACTOR, Subcontractors, Suppliers, or anyone else for whom CONTRACTOR is responsible.

D. If CONTRACTOR encounters a Hazardous Environmental Condition or if CONTRACTOR or anyone for whom CONTRACTOR is responsible creates a Hazardous Environmental Condition, CONTRACTOR shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such

condition and in any area affected thereby (except in an emergency as required by paragraph 6.16); and (iii) 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.

E. CONTRACTOR shall not be required to resume Work in connection with such condition or in any affected area until after OWNER has obtained any required permits related thereto and delivered to CONTRACTOR written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. 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, either party may make a Claim therefor as provided in paragraph 10.05.

F. 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. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in paragraph 10.05. OWNER may have such deleted portion of the Work performed by OWNER'S own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER'S Consultants, and the officers, directors, partners, employees, agents, other 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 created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing in this paragraph 4.06.G shall obligate CONTRACTOR to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. The provisions of paragraphs 4.02, 4.03, and 4.04 are not intended to apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 - BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. CONTRACTOR shall furnish performance and payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR'S obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Contract Documents.

B. All Bonds shall be in the form prescribed by the Contract Documents, except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

C. If the surety on any Bond furnished by CONTRACTOR is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of paragraph 5.01.B, CONTRACTOR shall within 20 days thereafter substitute another Bond and surety, both of which shall comply with the requirements of paragraphs 5.01.B and 5.02.

5.02. *Licensed Sureties and Insurers*

A. All Bonds and insurance required by the Contract Documents to be purchased and maintained by OWNER or CONTRACTOR shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue Bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. CONTRACTOR shall deliver to OWNER, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by OWNER or any other additional insured) which CONTRACTOR is required to purchase and maintain. OWNER shall deliver to CONTRACTOR, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by CONTRACTOR or any other additional insured) which OWNER is required to purchase and maintain.

5.04 *CONTRACTOR'S Liability Insurance*

A. CONTRACTOR shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which 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:

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

2. claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR'S employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR'S employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR, or (ii) by any other person for any other reason;

5. 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; and

6. 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.

B. The policies of insurance so required by this paragraph 5.04 to be purchased and maintained shall:

1. with respect to insurance required by paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) OWNER, ENGINEER, ENGINEER'S Consultants, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, and other 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;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering CONTRACTOR'S indemnity obligations under paragraphs 6.07, 6.11, and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least thirty days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the CONTRACTOR pursuant to paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when CONTRACTOR may be correcting, removing, or replacing defective Work in accordance with paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment (and CONTRACTOR shall furnish OWNER and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to OWNER and any such additional insured of continuation of such insurance at final payment and one year thereafter).

5.05 *OWNER'S Liability Insurance*

A. In addition to the insurance required to be provided by CONTRACTOR under paragraph 5.04, 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.

5.06 *Property Insurance (See Supplementary Conditions)*

5.07 (Not Used)

5.08 (Not Used)

5.09 (Not Used)

5.10 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either OWNER or CONTRACTOR has any objection to the coverage afforded by or other provisions of the Bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by paragraph 2.05.C. OWNER and CONTRACTOR shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the Bonds and insurance required of such party by the Contract Documents, 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. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent Bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *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, but CONTRACTOR shall not be responsible for the negligence of OWNER or ENGINEER in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents.

B. At all times during the progress of the Work, CONTRACTOR shall assign a competent resident superintendent thereto who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances. The superintendent will be CONTRACTOR'S representative at the Site and shall have authority to act on behalf of CONTRACTOR. All communications given to or received from the superintendent shall be binding on CONTRACTOR.

6.02 *Labor; Working Hours*

A. CONTRACTOR shall provide competent, suitably qualified personnel to survey, lay out, and construct the Work 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, and CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday, or any legal holiday without OWNER'S written consent (which will not be unreasonably withheld) given after prior written notice to ENGINEER.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the General Requirements, 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.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for 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. 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.

6.04 *Progress Schedule*

A. CONTRACTOR shall adhere to the progress schedule established in accordance with paragraph 2.07 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 2.07) proposed adjustments in the progress schedule that will not result in changing the Contract Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of Article 12. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

6.05 *Substitutes and "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 specification or description 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 or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to ENGINEER for review under the circumstances described below.

1. *"Or-Equal" Items:* If, in ENGINEER'S sole discretion, an item of material or equipment proposed by CONTRACTOR is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by ENGINEER as an "or-equal" item, in which case review and approval of the proposed item may, in ENGINEER'S sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this paragraph 6.05.A.1, 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: (i) it is at least equal in quality, durability, appearance, strength, and design characteristics; (ii) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole; and CONTRACTOR;

b. Certifies that: (i) there is no increase in cost to the OWNER; and (ii) it will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items*

a. If, in ENGINEER'S sole discretion, an item of material or equipment proposed by CONTRACTOR does not qualify as an "or-equal" item under paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR.

c. The procedure for review by ENGINEER will be as set forth in paragraph 6.05.A.2.d, as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances.

d. CONTRACTOR shall first 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 shall certify that the proposed substitute item will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified, and be suited to the same use as that specified. The application will state the extent, if any, to which the use of the proposed substitute item will prejudice CONTRACTOR'S achievement of Substantial Completion on time, whether or not 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 work on the Project) to adapt the design to the proposed substitute item and whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change, all of which will be considered by ENGINEER in evaluating the proposed substitute item. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute item.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is shown or indicated in and expressly required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by ENGINEER. CONTRACTOR shall submit sufficient information to allow ENGINEER, in ENGINEER'S sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in subparagraph 6.05.A.2.

C. *Engineer's Evaluation:* ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.05.A and 6.05.B. ENGINEER will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized until ENGINEER'S review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." ENGINEER will advise CONTRACTOR in writing of any negative determination.

D. *Special Guarantee:* OWNER may require CONTRACTOR to furnish at CONTRACTOR'S expense a special performance guarantee or other surety with respect to any substitute.

E. *ENGINEER'S Cost Reimbursement:* ENGINEER will record time required by ENGINEER and ENGINEER'S Consultants in evaluating substitute proposed or submitted by CONTRACTOR pursuant to paragraphs 6.05.A.2 and 6.05.B and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER approves a substitute item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER'S Consultants for evaluating each such proposed substitute.

F. *CONTRACTOR'S Expense:* CONTRACTOR shall provide all data in support of any proposed substitute or "or-equal" at CONTRACTOR'S expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. CONTRACTOR shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to OWNER as indicated in paragraph 6.06.B), whether initially or as a replacement, against whom OWNER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to OWNER in advance for acceptance by OWNER by a specified date prior to the Effective Date of the Agreement, and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER'S acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. CONTRACTOR shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued or Written Amendment signed. 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 any right of OWNER or ENGINEER to reject defective Work.

C. 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. Nothing in the Contract Documents 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 shall it create any obligation on the part of OWNER or ENGINEER to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. CONTRACTOR shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR.

E. CONTRACTOR shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with ENGINEER through CONTRACTOR.

F. 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.

G. All Work performed for CONTRACTOR by a Subcontractor or Supplier will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and ENGINEER. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 5.06, the agreement between the CONTRACTOR and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against OWNER, CONTRACTOR, ENGINEER, ENGINEER'S Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other 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 such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, CONTRACTOR will obtain the same.

6.07 *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. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER'S Consultants, and the officers, directors, partners, employees or agents, and other consultants 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.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, 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 opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto, such as plant investment fees.

6.09 *Laws and Regulations*

A. CONTRACTOR shall give all notices and 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 knowing or having reason to know that it is contrary to Laws or Regulations, CONTRACTOR shall bear 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; however, it shall not be CONTRACTOR'S primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve CONTRACTOR of CONTRACTOR'S obligations under paragraph 3.03.

6.10 *Taxes*

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

6.11 *Use of Site and Other Areas*

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

1. CONTRACTOR shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER'S Consultant, and the officers, directors, partners, employees, agents, and other consultants 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 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 by or based upon CONTRACTOR'S performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work CONTRACTOR shall keep the Site and other 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 make it ready for utilization by OWNER. At the completion of the Work CONTRACTOR shall remove from the Site 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 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 property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. CONTRACTOR shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents, together with all approved Samples and a counterpart of all approved Shop Drawings, will be available to ENGINEER for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to ENGINEER for OWNER.

6.13 *Safety and Protection*

A. CONTRACTOR shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. 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, 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 owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury, or loss to any property referred to in paragraph 6.13.A.2 or 6.13.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 (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of OWNER or ENGINEER or ENGINEER'S Consultant, 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). CONTRACTOR'S duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *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.

6.15 *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.

6.16 *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.

6.17 *Shop Drawings and Samples*

A. CONTRACTOR shall submit Shop Drawings to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. All submittals will be identified as ENGINEER may require and in the number of copies specified in the General Requirements. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show ENGINEER the services, materials, and equipment CONTRACTOR proposes to provide and to enable ENGINEER to review the information for the limited purposes required by paragraph 6.17.E.

B. CONTRACTOR shall also submit Samples to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers, and the use for which intended and otherwise as ENGINEER may require to enable ENGINEER to review the submittal for the limited purposes required by paragraph 6.17.E. The numbers of each Sample to be submitted will be as specified in the Specifications.

C. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER as required by paragraph 2.07, 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.

D. *Submittal Procedures*

1. Before submitting each Shop Drawing or Sample, CONTRACTOR shall have determined and verified:

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

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

c. all information relative to means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

d. CONTRACTOR shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR'S obligations under the Contract Documents with respect to CONTRACTOR'S review and approval of that submittal.

3. At the time of each submittal, CONTRACTOR shall give ENGINEER specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to ENGINEER for review and approval of each such variation.

E. *ENGINEER'S Review*

1. ENGINEER will timely review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample 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 (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. ENGINEER'S review and approval of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called ENGINEER'S attention to each such variation at the time of each submittal as required by paragraph 6.17.D.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 approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for complying with the requirements of paragraph 6.17.D.1.

F. *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.

6.18 *Continuing the Work*

A. CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by paragraph 15.04 or as OWNER and CONTRACTOR may otherwise agree in writing.

6.19 *CONTRACTOR'S General Warranty and Guarantee*

A. CONTRACTOR warrants and guarantees to OWNER, ENGINEER, and ENGINEER'S Consultants that all Work will be in accordance with the Contract Documents and will not be defective. CONTRACTOR'S

warranty and guarantee 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.

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

1. observations by ENGINEER;

2. recommendation 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 acceptance by OWNER or any failure to do so;

6. any review and approval of a Shop Drawing or Sample submittal or 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.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER'S Consultants, and the officers, directors, partners, employees, agents, and other 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:

1. is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of real or personal property (other than the Work itself), including the loss of use resulting therefrom; and

2. is caused in whole or in part by any 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, regardless of whether or not caused in part by an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws or Regulations.

B. In any and all claims against OWNER or ENGINEER or any of their respective consultants, agents, officers, directors, partners, or employees 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 6.20.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 6.20.A shall not be limited in any way by the amount or types of insurance provided by CONTRACTOR under Article 5 of the General Conditions.

D. The indemnification obligations of CONTRACTOR under paragraph 6.20.A shall not extend to the sole negligence or willful misconduct of OWNER, ENGINEER or ENGINEER'S Consultants or to the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them.

ARTICLE 7 - OTHER WORK

7.01 *Related Work at Site*

A. OWNER may perform other work related to the Project at the Site by OWNER'S employees, or let other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to CONTRACTOR prior to starting any such other work; and

2. if OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in paragraph 10.05.

B. CONTRACTOR shall afford each other contractor who is a party to such a direct contract and each utility owner (and OWNER, if OWNER is performing the other work with OWNER'S employees) proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, 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 their work and will only cut or alter their work with the written consent of ENGINEER and the others whose work will be affected. The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such utility owners and other contractors.

C. If the proper execution or results of any part of CONTRACTOR'S Work depends upon work performed by others under this Article 7, 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.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, OWNER shall issue all communications to CONTRACTOR through ENGINEER.

8.02 *Furnish Data*

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

8.03 *Pay Promptly When Due*

A. OWNER shall make payments to CONTRACTOR promptly when they are due as provided in paragraphs 14.02.C and 14.07.C.

8.04 *Lands and Easements; Reports and Tests*

A. OWNER'S duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.01 and 4.05. Paragraph 4.02 refers to OWNER'S identifying and making available to CONTRACTOR copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by ENGINEER in preparing the Contract Documents.

8.05 *Insurance*

A. OWNER'S responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.06 *Change Orders*

A. OWNER is obligated to execute Change Orders as indicated in paragraph 10.03.

8.07. *Inspections, Tests, and Approvals*

A. OWNER'S responsibility in respect to certain inspections, tests, and approvals is set forth in paragraph 13.03.B.

8.08 *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.

8.09 *Undisclosed Hazardous Environmental Condition*

A. OWNER'S responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in paragraph 4.06.

8.10 *Evidence of Financial Arrangements*

A. If and to the extent OWNER has agreed to furnish CONTRACTOR reasonable evidence that financial arrangements have been made to satisfy OWNER'S obligations under the Contract Documents, OWNER'S responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *OWNER'S Representative*

A. ENGINEER will be OWNER'S representative during the construction period. The duties and responsibilities and the limitations of authority of ENGINEER as OWNER'S representative during construction are set forth in the Contract Documents and will not be changed without written consent of OWNER and ENGINEER.

9.02 *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 9.10, and 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.

9.03 *Project Representative*

A. If OWNER and ENGINEER agree, ENGINEER will furnish a Resident Project Representative to assist ENGINEER in providing more extensive observation of the Work. The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9.10 and in the Supplementary Conditions. 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.

9.04 *Clarifications and Interpretations*

A. ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents as ENGINEER may determine necessary, which shall be consistent with the intent of and reasonably inferable from the Contract Documents. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a written clarification or interpretation, a Claim may be made therefor as provided in paragraph 10.05.

9.05 *Authorized Variations in Work*

A. ENGINEER may authorize minor variations in the Work from the requirements of the Contract Documents which 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. These may be

accomplished by a Field Order and will be binding on OWNER and also on CONTRACTOR, who shall perform the Work involved promptly. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of a Field Order, a Claim may be made therefor as provided in paragraph 10.05.

9.06 *Rejecting Defective Work*

A. ENGINEER will have authority to disapprove or reject Work which ENGINEER believes to be defective, or that ENGINEER believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. ENGINEER will also have authority to require special inspection or testing of the Work as provided in paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.07 *Shop Drawings, Change Orders and Payments*

A. In connection with ENGINEER'S authority as to Shop Drawings and Samples, see paragraph 6.17.

B. In connection with ENGINEER'S authority as to Change Orders, see Articles 10, 11, and 12.

C. In connection with ENGINEER'S authority as to Applications for Payment, see Article 14.

9.08 *Determinations for Unit Price Work*

A. ENGINEER will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. ENGINEER will review 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 paragraph 10.05.

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

A. ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work, the quantities and classifications of Unit Price Work, the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, and Claims seeking changes in the Contract Price or Contract Times will be referred initially to ENGINEER in writing, in accordance with the provisions of paragraph 10.05, with a request for a formal decision.

B. When functioning as interpreter and judge under this paragraph 9.09, ENGINEER will not show partiality to OWNER or CONTRACTOR and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by ENGINEER pursuant to this paragraph 9.09 with respect to any such Claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.07) will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such Claim, dispute, or other matter.

9.10 *Limitations on ENGINEER'S Authority and Responsibilities*

A. Neither ENGINEER'S authority or responsibility under this Article 9 or under any other provision of the Contract Documents 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 14.07.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 9.10 shall also apply to ENGINEER'S Consultants, Resident Project Representative, and assistants.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Agreement and without notice to any surety, OWNER may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If OWNER and CONTRACTOR are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in paragraph 10.05.

10.02 *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 as provided in paragraph 3.04, except in the case of an emergency as provided in paragraph 6.16 or in the case of uncovering Work as provided in paragraph 13.04.B.

10.03 *Execution of Change Orders*

A. OWNER and CONTRACTOR shall execute appropriate Change Orders recommended by ENGINEER (or Written Amendments) covering:

1. changes in the Work which are: (i) ordered by OWNER pursuant to paragraph 10.01.A, (ii) required because of acceptance of defective Work under paragraph 13.08.A or OWNER'S correction of defective Work under paragraph 13.09, or (iii) agreed to by the parties;

2. 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; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in paragraph 6.18.A.

10.04 *Notification to Surety*

A. If notice 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) is required by the provisions of any Bond to be given to a surety, 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.

10.05 *Claims and Disputes*

A. *Notice:* Written notice stating the general nature of each Claim, dispute, or other matter shall be delivered by the claimant to ENGINEER and the other party to the Contract promptly (but in no event later than 20 days) after the start of the event giving rise thereto. Notice of the amount or extent of the Claim, dispute, or other matter with supporting data shall be delivered to the ENGINEER and the other party to the Contract within 45 days after the start of such event (unless ENGINEER allows additional time for claimant to submit additional or more accurate data in support of such Claim, dispute, or other matter). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to ENGINEER and the claimant

within 30 days after receipt of the claimant's last submittal (unless ENGINEER allows additional time).

B. *ENGINEER'S Decision:* ENGINEER will render a formal decision in writing within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any. ENGINEER'S written decision on such Claim, dispute, or other matter will be final and binding upon OWNER and CONTRACTOR unless:

1. an appeal from ENGINEER'S decision is taken within the time limits and in accordance with the dispute resolution procedures set forth in Article 16; or

2. if no such dispute resolution procedures have been set forth in Article 16, a written notice of intention to appeal from ENGINEER'S written decision is delivered by OWNER or CONTRACTOR to the other and to ENGINEER within 30 days after the date of such decision, and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction within 60 days after the date of such decision or within 60 days after Substantial Completion, whichever is later (unless otherwise agreed in writing by OWNER and CONTRACTOR), to exercise such rights or remedies as the appealing party may have with respect to such Claim, dispute, or other matter in accordance with applicable Laws and Regulations.

C. If ENGINEER does not render a formal decision in writing within the time stated in paragraph 10.05.B, a decision denying the Claim in its entirety shall be deemed to have been issued 31 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any.

D. No Claim for an adjustment in Contract Price or Contract Times (or Milestones) will be valid if not submitted in accordance with this paragraph 10.05.

ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to CONTRACTOR will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in paragraph 11.01.B.

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 at the Site. 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, 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 11.01.

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, 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 5.06.D), 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 telegrams, long distance telephone calls, telephone service at the Site, expressage, and similar petty cash items in connection with the Work.

i. When the Cost of the Work is used to determine the value of a Change Order or of a Claim, the cost of premiums for additional Bonds and insurance required because of the changes in the Work or caused by the event giving rise to the Claim.

j. When all the Work is performed on the basis of cost-plus, the costs of premiums for all Bonds and insurance CONTRACTOR is required by the Contract Documents to purchase and maintain.

B. *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, 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 11.01.A.1 or specifically covered by paragraph 11.01.A.4, all of which 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 paragraphs 11.01.A and 11.01.B.

C. *CONTRACTOR'S Fee:* When all the Work 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 or when a Claim for an 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 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to paragraphs 11.01.A and 11.01.B, 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.

11.02 *Cash 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 as may be acceptable to OWNER and ENGINEER. CONTRACTOR agrees that:

1. the 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 costs, overhead, profit, and other expenses contemplated for the 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.

B. 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.

11.03 *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. 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. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by ENGINEER subject to the provisions of paragraph 9.08.

B. 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.

C. For provisions for an adjustment of a unit price for an increase or decrease in the quantity of Unit Price Work, if any, see General Requirements Section 01270, Measurement and Payment.

ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the claim to the ENGINEER and the other party to the Contract in accordance with the provisions of paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for 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, by application of such unit prices to the quantities of the items involved (subject to the provisions of paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in paragraph 11.01) plus a CONTRACTOR'S fee for overhead and profit (determined as provided in paragraph 12.01.C).

C. *CONTRACTOR'S Fee:* 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 11.01.A.1 and 11.01.A.2, the CONTRACTOR'S fee shall be 15 percent;

b. for costs incurred under paragraph 11.01.A.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 paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and CONTRACTOR will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

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 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times (or Milestones) may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Times (or Milestones) shall be based on written notice submitted by the party making the claim to the ENGINEER and the other party to the Contract in accordance with the provisions of paragraph 10.05.

B. Any adjustment of the Contract Times (or Milestones) covered by a Change Order or of any Claim for an adjustment in the Contract Times (or Milestones) will be determined in accordance with the provisions of this Article 12.

12.03 *Delays Beyond CONTRACTOR'S Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of CONTRACTOR, the Contract Times (or Milestones) will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in paragraph 12.02.A. Delays beyond the control of CONTRACTOR shall include, but not be limited to, acts or neglect by OWNER, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

12.04 *Delays Within CONTRACTOR'S Control*

A. The Contract Times (or Milestones) will not be extended due to delays within the control of CONTRACTOR. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of CONTRACTOR.

12.05 *Delays Beyond OWNER'S and CONTRACTOR'S Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR'S sole and exclusive remedy for such delay.

12.06 *Delay Damages*

A. In no event shall OWNER or ENGINEER be liable to CONTRACTOR, any Subcontractor, any Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from:

1. delays caused by or within the control of CONTRACTOR; or

2. delays beyond the control of both OWNER and CONTRACTOR including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God, or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

B. Nothing in this paragraph 12.06 bars a change in Contract Price pursuant to this Article 12 to compensate CONTRACTOR due to delay, interference, or disruption directly attributable to actions or inactions of OWNER or anyone for whom OWNER is responsible.

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

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which OWNER or ENGINEER has actual knowledge will be given to CONTRACTOR. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. OWNER, ENGINEER, ENGINEER'S Consultants, other representatives and personnel of OWNER, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. CONTRACTOR shall provide them proper and safe conditions for such access and advise them of CONTRACTOR'S Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. CONTRACTOR shall give ENGINEER timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. OWNER shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.04.B shall be paid as provided in said paragraph 13.04.B; and

3. as otherwise specifically provided in the Contract Documents.

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 and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for OWNER'S and ENGINEER'S acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to CONTRACTOR'S purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to OWNER and ENGINEER.

E. 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, it must, if requested by ENGINEER, be uncovered for observation.

F. Uncovering Work as provided in paragraph 13.03.E shall be at CONTRACTOR'S expense unless CONTRACTOR has given ENGINEER timely notice of CONTRACTOR'S intention to cover the same and ENGINEER has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of ENGINEER, it must, if requested by

ENGINEER, be uncovered for ENGINEER'S observation and replaced at CONTRACTOR'S expense.

B. If ENGINEER considers it necessary or advisable that covered Work be observed by ENGINEER or inspected or tested by others, CONTRACTOR, at ENGINEER'S request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as ENGINEER may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment. If it is found that such Work is defective, 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 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 OWNER shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, OWNER may make a Claim therefor as provided in paragraph 10.05. If, however, such Work is not found to be defective, CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Times (or Milestones), 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, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

13.05 *OWNER May Stop the Work*

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

13.06 *Correction or Removal of Defective Work*

A. CONTRACTOR shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by ENGINEER, remove it from the Project and replace it with Work that is not defective. 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 removal (including but not limited to all costs of repair or replacement of work of others).

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for CONTRACTOR'S use by OWNER or permitted by Laws and Regulations as contemplated in paragraph 6.11.A is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER'S written instructions: (i) repair such defective land or areas, or (ii) correct such defective Work or, if the defective Work has been rejected by OWNER, remove it from the Project and replace it with Work that is not defective, and (iii) satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the defective Work corrected or repaired or may have the rejected Work removed and replaced, and 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) will be paid by CONTRACTOR.

B. 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 or by Written Amendment.

C. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph 13.07, 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.

D. CONTRACTOR'S obligations under this paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, OWNER (and, prior to ENGINEER'S recommendation of final payment, ENGINEER) prefers to accept it, OWNER may do so. 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) attributable to OWNER'S evaluation of and determination to accept such defective Work (such costs to be approved by ENGINEER as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by CONTRACTOR pursuant to this sentence. If any such acceptance occurs prior to ENGINEER'S recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and OWNER shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, OWNER may make a Claim therefor as provided in paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER.

13.09 *OWNER May Correct Defective Work*

A. If CONTRACTOR fails within a reasonable time after written notice from ENGINEER to correct defective Work or to remove and replace rejected Work as required by ENGINEER in accordance with paragraph 13.06.A, 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, OWNER may, after seven days written notice to CONTRACTOR, correct and remedy any such deficiency.

B. In exercising the rights and remedies under this paragraph, OWNER shall proceed expeditiously. In connection with such corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the Site, take possession of all or part of the Work and suspend CONTRACTOR'S services related thereto, take possession of CONTRACTOR'S tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER'S representatives, agents and employees, OWNER'S other contractors, and ENGINEER 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 (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) incurred or sustained by OWNER in exercising the rights and remedies under this paragraph 13.09 will be charged against CONTRACTOR, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, OWNER may make a Claim therefor as provided in paragraph 10.05. 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 (or Milestones) 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 13.09.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The schedule of values established as provided in paragraph 2.07.A 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.

14.02 *Progress Payments*

A. *Applications for Payments*

1. At least 10 days before the date established 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 and 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.

B. *Review of Applications*

1. ENGINEER will, within 10 days after receipt of each Application for Payment, 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 on the Site 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, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.08, and to 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: (i) 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 Documents; or (ii) that 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 to supervise, direct, or control the Work or for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for CONTRACTOR'S failure to comply with Laws and Regulations applicable to CONTRACTOR'S performance of the Work. Additionally, said review or recommendation will not impose responsibility on ENGINEER to make any examination to ascertain how or for what purposes CONTRACTOR has used the moneys paid on account of the Contract Price, or 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 referred to in paragraph 14.02.B.2. ENGINEER may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in ENGINEER'S opinion to protect OWNER from loss because:

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

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

c. OWNER has been required to correct defective Work or complete Work in accordance with paragraph 13.09; or

d. ENGINEER has actual knowledge of the occurrence of any of the events enumerated in paragraph 15.02.A.

C. *Payment Becomes Due*

1. Sixty days after presentation of the Application for Payment to OWNER with ENGINEER'S recommendation, the amount recommended will (subject to the provisions of paragraph 14.02.D) become due, and when due will be paid by OWNER to CONTRACTOR.

D. *Reduction in Payment*

1. OWNER may refuse to make payment of the full amount recommended by ENGINEER because:

a. claims have been made against OWNER on account of CONTRACTOR'S performance or furnishing of the Work;

b. 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;

c. there are other items entitling OWNER to a set-off against the amount recommended; or

d. OWNER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.02.B.5.a through 14.02.B.5.c or paragraph 15.02.A.

2. If OWNER refuses to make payment of the full amount recommended by ENGINEER, OWNER must give CONTRACTOR immediate written notice (with a copy to ENGINEER) stating the reasons for such action and promptly pay CONTRACTOR any amount remaining after deduction of the amount so withheld. OWNER shall promptly pay CONTRACTOR the amount so withheld, or any adjustment thereto agreed to by OWNER and CONTRACTOR, when CONTRACTOR corrects to OWNER'S satisfaction the reasons for such action.

3. If it is subsequently determined that OWNER'S refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by paragraph 14.02.C.1.

14.03 *CONTRACTOR'S Warranty of Title*

A. CONTRACTOR warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER no later than the time of payment free and clear of all Liens.

14.04 *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 (except for items specifically listed by CONTRACTOR as incomplete) and request that ENGINEER issue a certificate of Substantial Completion. Promptly thereafter, 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. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and deliver to OWNER a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. OWNER shall have seven days after receipt of the tentative certificate during which to make written objection to ENGINEER as to any provisions of the certificate or attached list. If, after considering such objections, ENGINEER concludes that the Work is not substantially complete, ENGINEER will within 14 days after submission of the tentative certificate to OWNER notify CONTRACTOR in writing, stating the reasons therefor. If, after consideration of OWNER'S objections, ENGINEER considers the Work substantially complete, ENGINEER will within said 14 days execute and deliver to OWNER and CONTRACTOR a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as ENGINEER believes justified after consideration of any objections from OWNER. At the time of delivery of the tentative certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibilities pending final payment between OWNER and CONTRACTOR

with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER in writing prior to ENGINEER'S issuing the definitive certificate of Substantial Completion, ENGINEER'S aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

B. OWNER shall have the right to exclude CONTRACTOR from the Site after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Use by OWNER at OWNER'S option of 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, may be accomplished prior to Substantial Completion of all the Work subject to the following conditions.

1. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CONTRACTOR will certify to OWNER and ENGINEER that such part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify OWNER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. 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 14.04 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.

2. No occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of the Supplementary Conditions regarding property insurance.

14.06 *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 is incomplete or defective. CONTRACTOR shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *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, marked-up record documents (as provided in paragraph 6.12), and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by subparagraph 5.04.B.7; (ii) consent of the surety, if any, to final payment; and (iii) complete and legally effective releases or waivers (satisfactory to OWNER) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in paragraph 14.07.A.2 and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full and an affidavit of CONTRACTOR that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which OWNER or OWNER'S property might in any way be responsible have been

paid or otherwise satisfied. 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.

B. *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 Documents have been fulfilled, ENGINEER will, within 10 days after receipt of the final Application for Payment, indicate in writing ENGINEER'S recommendation of payment and present the Application for Payment to OWNER for payment. 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 14.09. 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. *Payment Becomes Due*

1. Sixty days after the presentation to OWNER of the Application for Payment and accompanying documentation, the amount recommended by ENGINEER will become due and, when due, will be paid by OWNER to CONTRACTOR.

D. *Final Completion Delayed*

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

14.08 *(Not Used)*

14.09 *Waiver of Claims*

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

1. a waiver of all Claims by OWNER against CONTRACTOR, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from CONTRACTOR'S continuing obligations under the Contract Documents; and

2. a waiver of all Claims by CONTRACTOR against OWNER other than those previously made in writing which are still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 *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 notice in writing to CONTRACTOR and ENGINEER which will fix the date on which Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR shall be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if CONTRACTOR makes a Claim therefor as provided in paragraph 10.05.

15.02 *OWNER May Terminate for Cause*

A. The occurrence of any one or more of the following events will 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 established under paragraph 2.07 as adjusted from time to time pursuant to paragraph 6.04);

2. CONTRACTOR'S disregard of Laws or Regulations of any public body having jurisdiction;

3. CONTRACTOR'S disregard of the authority of ENGINEER; or

4. CONTRACTOR'S violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in paragraph 15.02.A occur, OWNER may, after giving CONTRACTOR (and the surety, if any) seven days written notice, terminate the services of CONTRACTOR, exclude CONTRACTOR from the Site, and take possession of the Work and of all CONTRACTOR'S tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion), incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere, and finish the Work as OWNER may deem expedient. In such case, CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, 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) sustained by OWNER arising out of or relating to completing the Work, such excess will be paid to CONTRACTOR. If such claims, costs, losses, and damages exceed 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.

C. 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. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability.

15.03 *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, elect to terminate the Contract. In such case, CONTRACTOR shall be paid (without duplication of any items):

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

2. for 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;

3. for 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) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. for reasonable expenses directly attributable to termination.

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

15.04 *CONTRACTOR May Stop Work or Terminate*

A. If, through no act or fault of CONTRACTOR, the Work is suspended for more than 90 consecutive days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within 30 days after it is submitted, or OWNER fails for 60 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 15.03. 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 60 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 15.04 are not intended to preclude CONTRACTOR from making a Claim under paragraph 10.05 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 16 - DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Dispute resolution methods and procedures, if any, shall be as set forth in the Supplementary Conditions. If no method and procedure has been set forth, and subject to the provisions of paragraphs 9.09 and 10.05, OWNER and CONTRACTOR may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any dispute.

ARTICLE 17 - MISCELLANEOUS

17.01 *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 delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

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

17.03 *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 Documents, and 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.

17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

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

17.06 *Headings*

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

END OF GENERAL CONDITIONS

ERIE COUNTY WATER AUTHORITY
BUFFALO, NEW YORK

CONTRACT NO: GHD-07
WATER SYSTEM IMPROVEMENTS GUENTHER PUMP STATION REHABILITATION
PROJECT NO: 201800138

SECTION 00800

SUPPLEMENTARY CONDITIONS

SCOPE

These Supplementary Conditions amend or supplement the General Conditions. All provisions of the General Conditions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions which are defined in the General Conditions have the meanings assigned to them in the General Conditions.

SC-1.01.A.7. Modify paragraph 1.01.A.7. by changing the word "Advertisement" in the first sentence to "Notice".

SC-1.01.A.43 Add the following to Paragraph 1.01.A.43:

Substantial Completion for a watermain shall be achieved at such time as the watermain, or portion thereof, has been installed, tested, disinfected, issuance of Completed Works Approval by the Erie County Water Authority, all of the services transferred, if applicable, all the hydrants installed, all of the interconnections made, and all of the abandonments performed.

SC-4.02 Add new paragraph immediately after paragraph 4.02.B which is to read as follows:

SC-4.02.C In the preparation of the Drawings and Specifications, ENGINEER has relied upon:

The following records of explorations and tests of subsurface conditions at the Site:

a. Test Boring Logs (#1-3) Completed by Barron & Associates P.C. & Buffalo Drilling Company

The following drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Facilities) which are at or contiguous to the Site:

a. Appendix E

Geotechnical Engineering Report (Barron & Associates P.C. & Buffalo Drilling Company) has been included as Appendix E for informational purposes only and is not part of the Contract Documents. Neither the Erie County Water Authority (OWNER) nor GHD (ENGINEER) warrants the accuracy or completeness of said documents, expressed or implied. The Contractor is responsible for any interpretations or conclusions the Contractor draws from the available documents. It is the responsibility of the Contractor to field verify all existing conditions.

SC-4.06.A Add a new paragraph immediately after paragraph 4.06.A which is to read as follows:

SC-4.06.A.1 In the preparation of the Drawings and Specifications, ENGINEER has relied upon:

The following Hazardous Environmental Conditions survey was performed for Asbestos-Containing Materials and Lead-Based Paint:

a. Appendix D

SC-5.01.A Modify the first part of the second sentence of paragraph 5.01.A of the General Conditions to read:

The payment Bond shall remain in effect for one year and the performance Bond shall remain in effect for two years after....

SC-5.04 through 5.10. Delete paragraph 5.04 through 5.10, inclusive, in their entirety.

SC-5.03 Add a new paragraph immediately after Paragraph 5.03, which is to read as follows:

"SC-5.04 *Insurance Requirements*

A. CONTRACTOR shall procure and maintain insurance in accordance with Insurance Requirements, as set forth in the attached Appendix B and hereby made a part of these General Conditions."

SC-6.02.B Add new paragraphs immediately after paragraph 6.02.B which are to read as follows:

"SC-6.02.B.1 Except where otherwise prohibited by Laws or Regulations, regular working hours are defined as up to 8 hours per day, beginning no earlier than 7:00 am and ending no later than 6:00 pm.

SC-6.02.B.2 Maintenance and cleanup activities may be performed during hours other than regular working hours provided that such activities do not require the startup or operation of construction equipment.

SC-6.02.B.3 If it shall become absolutely necessary to perform Work at night or on Saturdays, Sundays or legal holidays, written notice shall be submitted to OWNER and ENGINEER at least two days in advance of the need for such Work. OWNER will only consider the performance of such Work as can be performed satisfactorily under the conditions. Sufficient lighting and all other necessary facilities for carrying out and observing the Work shall be provided and maintained where such Work is being performed at night."

SC-6.06.G Modify paragraph 6.06.G. by changing paragraph reference 5.06 to SC-5.04.

SC-6.06.H Add the following new paragraph immediately following paragraph 6.06.G, which is to read as follows:

"SC-6.06.H The CONTRACTOR shall perform with the CONTRACTOR'S own organization, contract work amounting to not less than fifty percent of the original total contract price. The term "the CONTRACTOR'S own organization" shall be construed to include only workmen employed and paid directly by the CONTRACTOR, and equipment owned or rented by the CONTRACTOR, with or without operators."

SC-6.09.B. Add a new paragraph immediately after paragraph 6.09.B which is to read as follows:

"SC-6.09.C Refer to Article SC-18 for Laws and Regulations which, by terms of said Laws and Regulations are to be included in the Contract Documents. The failure to include in Article SC-18 any Law or Regulation applicable to the performance of the Work does not diminish CONTRACTOR'S responsibility to comply with all Laws and Regulations applicable to the performance of the work."

SC-6.10. Add a new paragraph immediately after paragraph 6.10.A, which is to read as follows:

"SC-6.10.B OWNER is exempt from payment of sales and compensating use taxes of the State of New York and of cities and counties 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-6.15.A. Add a new paragraph immediately after paragraph 6.15.A, which is to read as follows:

"SC-6.15.B 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 all Laws and regulations. CONTRACTOR shall provide a centralized location for the maintenance of the material safety data sheets or other hazard communication information required to be made available by any employer on the Site. Location of the material safety data sheets or other hazard communication information shall be readily accessible to the employees of any employer on the Site."

SC-7.01 Add a new paragraph immediately after Paragraph 7.01 which is to read as follows:

"SC-7.02 *Separate Contractor Claims*

A. Should CONTRACTOR cause damage to the work or property of any other contractor at the Site, or should any claim arising out of CONTRACTOR'S performance of the Work be made by any other contractor against CONTRACTOR, OWNER, or ENGINEER, CONTRACTOR shall promptly settle with such other contractor by agreement, or otherwise resolve the dispute by arbitration or at law.

B. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, and the officer, directors, partners, employees, agents, and other consultants or 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 directly, indirectly, or consequentially out of or relating to any claim or action, legal or equitable, brought by any other contractor against OWNER, ENGINEER, to the extent based upon CONTRACTOR'S performance of the Work.

C. Should another contractor cause damage to the Work or property of CONTRACTOR at the Site or should the performance of work by any other contractor give rise to any other claim, CONTRACTOR shall not institute any action, legal or equitable, against OWNER, ENGINEER, or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from OWNER, ENGINEER, on account of any such damage or claim.

D. If CONTRACTOR is delayed at any time in performing or furnishing Work by any act or neglect of another contractor and OWNER and CONTRACTOR are unable to agree as to the extent of any adjustment in

Contract Times attributable thereto, CONTRACTOR may make a claim for an extension of time in accordance with paragraph 10.05. Notwithstanding any other provision of the Contract Documents, an extension of the Contract Times shall be CONTRACTOR'S sole and exclusive remedy with respect to OWNER, ENGINEER, for any delay, disruption, interference or hindrance caused by any other contractor."

SC-9.03 Add a new paragraph immediately after paragraph 9.03.A which is to read as follows:

"SC-9.03.B. Resident Project Representative (RPR) will be OWNER'S agent at the Site, will act as directed by and under the supervision of OWNER, and will confer with OWNER AND ENGINEER regarding RPR's actions. RPR's dealings in matters pertaining to the on-site Work shall in general be with OWNER and CONTRACTOR keeping ENGINEER advised as necessary. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of CONTRACTOR."

SC-13.07 Modify paragraphs 13.07.A. and C. by changing the words "one year" in the first line to "two years".

SC-14.02,A. Add a new paragraph immediately after paragraph 14.02.A.3. which is to read as follows:

"4. Each Application for Payment shall be accompanied by a copy of the certified payroll record."

SC-14.07,A. Add a new paragraph immediately after paragraph 14.07.A.3. which is to read as follows:

"4. The Final Application for Payment shall be accompanied by a copy of the certified payroll record."

SC-14.07.A.2 Modify paragraph 14.07.A.2 by changing the words "subparagraph 5.04.B.7" to "SC-5.04".

SC-17.06 Add new paragraphs immediately after paragraph 17.06,A. which are to read as follows:

"ARTICLE SC-18 - STATUTORY REQUIREMENTS

SC-18.01 This Article contains portions of certain Laws or Regulations which, by provision of Law or Regulations, are required to be included in the Contract Documents. The material included in this Article may not be complete or current. CONTRACTOR'S obligation to comply with all Laws and Regulations applicable to the Work is set forth in paragraph 6.09 of the General Conditions.

SC-18.02 Non-Discrimination in Employment:

A. During the performance of this contract, CONTRACTOR agrees as follows:
   1. CONTRACTOR will not discriminate against any employee or applicant for employment because of race, creed, color, or national origin, and will take affirmative action to insure that they are afforded equal employment opportunities without discrimination because of race, creed, color or national origin. Such action shall be taken with reference but not limited to: recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff or termination, rates of pay or other forms of compensation, and selection for training or retraining, including apprenticeship and on-the-job training.
   2. CONTRACTOR will send to each labor union or representative of workers with which he has or is bound by a collective bargaining or other agreement or understanding, a notice, to be provided by the State Commission for Human Rights, advising such labor union or representative of the CONTRACTOR'S agreement under clauses 1. through 8. hereinafter called "non-discrimination clauses". If the CONTRACTOR was directed to do so by the OWNER as part of the Bid or negotiation of this contract, CONTRACTOR shall request labor union or representative to furnish him with a written statement that such labor union or representative will not discriminate because of race, creed, color or national origin and that such labor union or representative either will affirmatively cooperate within the limits of its legal and contractual authority, in the implementation of the policy and provisions of these non-discrimination clauses or that it consents and agrees that recruitment, employment, and the terms and conditions of employment under this contract shall be in accordance with the purposes and provisions of these non-discrimination clauses. If such labor union or representative fails or refuses to comply with such a request, that it furnish such a statement, CONTRACTOR shall promptly notify the State Commission for Human Rights of such failure or refusal.
   3. CONTRACTOR will post and keep posted in conspicuous places, available to employees and applicants for employment, notices to be provided by the State Commission for Human Rights setting forth the substance of the provisions of clauses 1. through 2. and such provisions of the State's Laws against discrimination as the State Commission for Human Rights shall determine.
   4. CONTRACTOR will state, in all solicitations or advertisements for employees placed by or on behalf of CONTRACTOR, that all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color or national origin.
   5. CONTRACTOR will comply with the provisions of the Executive Law, Human Rights Law, Article 15, will furnish all information and reports deemed necessary by the State Commission for Human Rights under these non-discrimination clauses and such sections of the Executive Law, and will permit access to his books, records and accounts by the State Commission for Human Rights, the Attorney General, District Commissioner of Housing and Community Renewal and the Industrial Commission for purposes of investigation to ascertain compliance with these non-discrimination clauses of the Executive Law, Human Rights Law, Article 15.

6. This contract may be forthwith canceled, terminated or suspended, in whole or in part, by the OWNER upon the basis of a finding made by the State Commission for Human Rights that CONTRACTOR has not complied with these non-discrimination clauses, and CONTRACTOR may be declared ineligible for future contracts made by or on behalf of the State or a public authority or agency of the State or housing authority, or an urban renewal agency, or contracts requiring the approval of the Commissioner of Housing and Community Renewal, until he has satisfied the State Commission for Human Rights after conciliation efforts by the Commission have failed to achieve compliance with these non-discrimination clauses and after a verified complaint has been filed with the Commission, notice thereof has been given to CONTRACTOR and an opportunity has been afforded him to be heard publicly before three members of the Commission. Such sanctions may be imposed and remedies invoked independently of or in addition to sanctions and remedies otherwise provided by law.
7. If this contract is canceled or terminated under clause 6., in addition to other rights of the OWNER provided in this contract upon its breach by CONTRACTOR, CONTRACTOR will hold the OWNER harmless against any additional expenses or costs incurred by the OWNER in completing the Work or in purchasing the services, materials, equipment or supplies contemplated by this contract, and the OWNER may withhold payments from CONTRACTOR in an amount sufficient for this purpose and recourse may be had against the surety on the Performance Bond if necessary.
8. CONTRACTOR will include the provisions of clauses 1. through 2. in every subcontract or purchase order altered only to reflect the proper identity of the parties in such a manner that such provisions will be binding upon each Subcontractor or vendor as to operations to be performed within the State of New York. CONTRACTOR will take such actions in enforcing such provisions of such subcontract or purchase order as the OWNER may direct, including sanctions or remedies for non-compliance. If CONTRACTOR becomes involved in or is threatened with litigation with a Subcontractor or vendor as a result of such direction by the OWNER, the CONTRACTOR shall promptly so notify the Attorney General, requesting him to intervene and to protect the interest of the State of New York.

SC-18.03 Affirmative Action Requirements:

A. During the performance of this Contract, the CONTRACTOR agrees that it will abide by and will require its subcontractors to abide by the AUTHORITY'S Affirmative Action Requirements and Women and Minority Business Enterprise Policy, as set forth in the attached Appendix A and hereby made a part of these General Conditions.

SC-18.04 Prevailing Rate Schedule:

A. The labor on this contract shall be performed in accordance with the requirements of Article 8 (Sections 220-223) of the New York State Labor Law. The supplements to be provided and wages to be paid to workers, laborers and mechanics employed on this

contract, determined pursuant to Section 220 of the Labor Law, are set forth in Appendix C, Prevailing Rate Schedule, attached to and hereby made a part of these General Conditions.

B. CONTRACTOR shall note that the wage rates and supplemental benefits shown in the attached schedules are subject to change. The wage rates and supplemental benefits to be paid and provided shall be those prevailing at the time the contract is being performed.

SC-18.05 Payments to Subcontractors:

A. In accordance with N.Y. State General Municipal Law, Section 106-b, CONTRACTOR shall:

1. Within fifteen calendar days of the receipt of any payment from the OWNER, the CONTRACTOR shall pay each of his Subcontractors and materialmen the proceeds from the payment representing the value of the work performed and/or materials furnished by the Subcontractor and/or materialman and reflecting the percentage of the Subcontractor's work completed or the materialman's material supplied in the requisition approved by the OWNER and based upon the actual value of the subcontract or purchase order less an amount necessary to satisfy any claims, liens or judgments against the Subcontractor or materialman which have not been suitably discharged and less any retained amount as hereafter described. The CONTRACTOR shall retain not more than five per centum of each payment to the Subcontractor and/or materialman except that the CONTRACTOR may retain in excess of five per centum but not more than ten per centum of each payment to the Subcontractor provided that prior to entering into a subcontract with the CONTRACTOR, the Subcontractor is unable or unwilling to provide a Performance bond and a Labor and Material bond both in the full amount of the subcontract at the request of the CONTRACTOR. However, the CONTRACTOR shall retain nothing from those payments representing proceeds owed the Subcontractor and/or materialman from OWNER'S payments to the CONTRACTOR for the remaining amounts of the contract balance after the work or portions thereof are substantially complete. Within fifteen calendar days of the receipt of payment from the CONTRACTOR, the Subcontractor and/or materialman shall pay each of his Subcontractors and materialmen in the same manner as the CONTRACTOR has paid the Subcontractor. Nothing provided herein shall create any obligation on the part of the OWNER to pay or to see to the payment of any moneys to any Subcontractor or materialman from any CONTRACTOR nor shall anything provided herein serve to create any relationship in contract or otherwise, implied or expressed, between the Subcontractor or materialman and the OWNER.

SC-18.06 Erie County Water Authority Apprenticeship Policy

A. During the performance of this Contract, the CONTRACTOR, its assigns, and designees, agree that it will abide by and will require its Subcontractors to abide by the Erie County Water Authority's Apprenticeship Policy, as stated in paragraph B of this Section.

B. That pursuant to New York State Labor Law §816-B, the Erie County Water Authority hereby mandates that all contractors and subcontractors entering into any construction contracts with the Erie County Water Authority shall have established apprenticeship agreements appropriate for the type and scope of work to be performed under the contract, that have been approved by the New York State Commissioner of Labor and shall require the employment of apprentices on Erie County Water Authority construction projects.

END OF SUPPLEMENTARY CONDITIONS

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.1 SITE LOCATION

A. Project Location – Town of Hamburg, Erie County, New York. Work will be completed at the Guenther Pump Station located near 3478 Pleasant Ave, Hamburg, New York 14075.

1.2 OWNER

A. The Erie County Water Authority (ECWA) is responsible for management of all water system assets; including buried infrastructure, tank sites, and pumping stations. As such, the scheduling of Work and equipment shut downs must be coordinated with the ECWA, referred to herein as OWNER.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. General

1. It is the intent and purpose of these Specifications and accompanying Contract Drawings to describe all construction Work associated with and included under the Guenther Pump Station Rehabilitation Project.

2. The project Work will be completed under a single prime contract.

3. The CONTRACTOR shall return to original condition, satisfactory to OWNER and ENGINEER, any damaged facilities caused by the CONTRACTOR’s operations at the CONTRACTOR’s expense.

4. The construction Work to be completed under this Contract requires temporary shutdown of some facilities. The CONTRACTOR shall refer to Section 01311, Coordination with Owner's Operations, for a sequence of construction. Section 01311 of this specification also defines specific tasks that are in the critical path of the execution of the Work and which must be addressed by the CONTRACTOR in the development of a Work plan.

5. It is the CONTRACTOR's responsibility to develop a work plan, sequence of operations, and schedule detailing, at a minimum, the following:

    a. Procedures to be employed.

    b. The equipment and materials to be used.

    c. The site-specific safety plan to be followed during the work.

    d. The plan for protection of existing equipment including electrical components.

    e. A schedule defining the duration of the work with milestone subtasks.

6. The CONTRACTOR shall provide all provisions required to protect OWNER personnel.

7. The CONTRACTOR shall provide a schedule to the OWNER and ENGINEER for approval within ten (10) calendar days of the notice of acceptance and in accordance with these Contract Documents.

8. The CONTRACTOR shall provide a detailed work plan and sequence of work to the OWNER and ENGINEER for approval a minimum of thirty (30) calendar days prior to the scheduled commencement of work and in accordance with Section 01311, Coordination with Owner's Operations. Upon review by the OWNER and ENGINEER, the CONTRACTOR shall attend a meeting to finalize the work plan and schedule.

9. The CONTRACTOR is responsible for having awareness and understanding of the scope of the work, as well as all applicable regulations, permits, and other requirements of the various agencies of jurisdiction. The CONTRACTOR is responsible for obtaining any and all permits, paying all costs thereof, and meeting all permit requirements.

10. The CONTRACTOR shall comply with all applicable requirements of the Occupational Safety and Health Act of 1970, and will hold the OWNER and ENGINEER harmless from any civil or criminal penalties imposed as a result of the CONTRACTOR's non-compliance with such requirements. No additional compensation for changes in the laws, regulations or the interpretation thereof shall be granted by the OWNER.

11. The CONTRACTOR is responsible for compliance with all local, state, and federal rules and regulations concerning safety, health and exposure from work and materials generated as a result of the work under this Project. All precautions necessary to comply with health and safety rules and regulations shall be employed by the CONTRACTOR and shall be the entire responsibility of the CONTRACTOR.

12. The CONTRACTOR shall be responsible for the provision of all equipment and necessary training, and shall have a documented confined space entry program in place while working within confined spaces. Confined space entry shall be in accordance with OSHA, local, state, and federal rules and regulations.

13. The CONTRACTOR's scope of work for this project also includes the following services:

    a. Provisions of a complete Project administration and management.

    b. Review and confirmation of Project scope.

    c. Development, in liaison with OWNER and ENGINEER, of the overall detailed Project schedule. The schedule shall not allow for any interruption of the existing facility operation other than those specifically addressed within these Contract Documents.

    d. Provisions for all required shop drawings and submittals.

    e. Procurement of all CONTRACTOR-supplied materials and equipment.

    f. Provisions for storage of all CONTRACTOR-supplied materials and equipment.

    g. Provision of all rigging.

    h. Dispose of all demolished materials and excess excavated materials off-Site in accordance with all federal, state, and local laws for the disposal of materials.

        1) All demolished material and surplus excavated materials shall be immediately removed from the Site.

        2) Roll-offs, dumpsters, and/or demolished material in staging areas shall be removed from the Project Site in a timely manner or as directed by the OWNER or ENGINEER.

3) Only one (1) dumpster is allowed on-Site at a time unless otherwise approved in writing by the OWNER. The dumpster shall be located in an area approved by the OWNER.

4) CONTRACTOR will be responsible for the costs to replace any existing equipment, which is to remain part of the finished installation, if damaged during demolition or damaged as a result of the CONTRACTOR's work.

14. Provision of all excavation and trenching necessary to complete the Project electrical work. This shall include all required and necessary backfill, grade, and refinish to match the existing surrounding area. The CONTRACTOR shall be responsible for all excavation, trenching, and restoration activities.

15. Provisions of all applicable permits and inspections. The CONTRACTOR shall make himself aware of all regulations and costs involved for any and all work required by the various agencies or municipalities having jurisdiction of the working area. No additional payments shall be made for any requirements necessary including such as bonds, insurance, flagmen, night watchmen, traffic control, police, etc. The costs shall be included in the various unit prices and lump sum prices bid under the project.

16. Payment of all applicable fees associated with the Project. This task shall include the local electrical utility company's fees, landfill tipping fees, etc. as required.

17. Installation, inspection, testing, commissioning and startup of all Project equipment and systems, and the overall Project startup assistance as required to successfully complete the Project.

18. Training of the OWNER's personnel, consisting of a classroom style training session for four (4) hours and up to eight (8) people for each piece of new equipment unless otherwise specified.

19. Provision of all specified spare parts.

20. Provisions of all as-built documentation including all as-built drawings, and all supplied equipment data and manuals showing actual construction of Work after the requirements of the "project closing punch list" have been satisfied. O&M manuals shall be provided as described in Section 01781.

21. Provisions of orderly work closeout, and work acceptance by OWNER.

22. Work guarantee and warranty.

23. The CONTRACTOR shall supply all supervision, labor, equipment, materials, and incidentals required to complete the Work outlined in this Section unless specified otherwise.

24. The materials, methods, and installations shall be appropriate for the various work area electrical classifications. The Work is within general purpose environments. Environments that are susceptible to corrosion are indicated in these Specifications.

25. It is anticipated that there may be a salvage value associated with the disposal of scrap metal associated with the piping and valve Work, and expects that the CONTRACTOR consider this salvage value when formulating the bid.

26. The Work under this Project includes the following Bid Items; organized by Contract:

A. Contract No. 1 – General Contract

The GENERAL CONTRACTOR, CONTRACTOR, or GC shall supply all supervision, labor, equipment, materials, and incidentals required to complete the Work outlined in this section unless specified otherwise. The Work under the Project includes, but is not limited to, the following:

Item 1: Pump Station Rehabilitation

1. Item 1A—Existing Building Improvements

   a. Demolish existing chemical storage room and bathroom of existing pump station building as indicated on the Contract Drawings.

   b. Remove and dispose of (4) existing pumps and motors (Pump Numbers 1-4). Supply and install (4) new pumps, motors, and Variable Frequency Drive assemblies. Pumps shall be redundantly sized units. CONTRACTOR shall be responsible for the supply and installation of new modifications to existing baseplate and pump foundations, as required to facilitate a successful installation. Modifications to baseplate and foundation change in the centerline elevation and/or horizontal alignment of the pump connections, CONTRACTOR is responsible for all necessary pipe and fittings modifications to ensure proper pump and motor installation and connection to existing suction and discharge header pipes. Normal operation features one pump running continuously, with the second and third pump available for additional supply and the fourth as an installed spare. CONTRACTOR shall be responsible for the disconnect and removal of existing motor starters; and supply, install, wiring, and connection of new variable frequency drives. Furnish and install differential pressure switch, discharge pressure switch, and suction and discharge pressure mechanical gauges on each pump assembly as indicated on the Contract Documents.

   c. Furnish and install (2) new line stop valves for temporary tank and pump station isolation from the water distribution system as specified and indicated on the Contract Drawings.

   d. Furnish and install (4) new variable frequency drives (VFDs) control panels to control each new pump motor. CONTRACTOR is directed to Appendix F for Typical Panel Schematic.

   e. Removal of (4) existing pump discharge check valves. Furnish and install pump discharge check valves with (4) new discharge check valves. Existing discharge check valves located on Pumps No. 1 and 2 are to be turn over to OWNER after removal.

   f. The CONTRACTOR shall coordinate the replacement of the OWNER's remote transmitting unit (RTU) from the existing building to the new panel mounting location as indicated on the drawings. The CONTRACTOR's scope of Work shall include the following:

      i. Disconnect and remove existing RTU panel from existing building and provide to OWNER.

      ii. New RTU panel shall be furnished under Item 2B - Cash Allowance for PLC and SCADA System Work. OWNER shall provide programming for new RTU panel installation location.

      iii. CONTRACTOR shall coordinate with OWNER for new RTU panel.

      iv. CONTRACTOR shall arrange for pickup of the RTU panel and obtain RTU installation instructions from the OWNER.

      v. CONTRACTOR shall deliver, store, and handle the RTU. CONTRACTOR shall be responsible for the RTU once in his possession and shall be responsible for any damage that may occur.

      vi. CONTRACTOR shall install the RTU panel at the new mounting location, as indicated on the Contract Drawings.

      vii. Complete all interconnecting wiring between the RTU and all other project equipment and field devices as shown on the Contract Drawings, described herein, or required to complete the installation.

viii. The CONTRACTOR shall provide a minimum of 6 feet of wire in the RTU cabinet for termination by the OWNER. The final conductor terminations at the RTU shall be performed by the OWNER.

g. Removal of existing potable water pump (Pump No. 5) and associated piping located in the pump station basement.

h. Removal and replacement of all existing flanged harness adapters as indicated on the Contract Drawings.

i. Removal and capping of existing pressure reducing valve cluster and associated piping located along south wall in the existing pump station basement.

j. Removal, relocation, and replacement of existing surge piping and associated surge relief valves as indicated on the Contract Drawings.

k. Removal and replacement of steel piping, valves, and appurtenances as specified and indicated on the Contract Drawings.

l. Furnish and install new steel piping, flanges, flange adapters, flanged butterfly, check, and surge valves, as shown on the Contract Drawings and as listed on the Valve Replacement Schedule. The CONTRACTOR shall be responsible for the supply and install of all coupling, adapters, restrained flanged coupling adapters, and hardware necessary to complete the valve and piping modifications and replacements. The CONTRACTOR shall be responsible for providing all pipe fittings, couplings, adapters, and appurtenances necessary to accommodate the change in lay length resulting from transitions from gate to butterfly style valves.

m. Removal and replacement of existing electric valve actuators and furnish and installation of new electric valve actuators as specified and indicated on the Contract Drawings.

n. Removal and replacement of existing butterfly valves within valve house as specified and indicated on the Contract Drawings.

o. Removal of piping, railings, and installation of new altitude valve, butterfly valve isolation, railings, and new monorail beam with manual hoist within the valve house as specified and indicated on the Contract Drawings.

p. Removal and replacement of existing butterfly valve and electric valve actuator and associated electrical modifications within pump station bypass valve chamber as specified and indicated on the Contract Drawings.

q. Removal and replacement of existing sump pump and electric modifications within flow meter chamber as specified and indicated on the Contract Drawings. CONTRACTOR shall verify the condition, size, and capacity parameters of the existing sump pump within the flow meter chamber before submittal review of replacement sump pump.

r. Removal and replacement of all existing four (4) transmitter instrumentation and wiring as specified and indicated on the Contract Drawings. Contractor is to remove, replace the instruments, and reconnect to existing piping.

s. Furnish and install one (1) new suction header transmitter instrumentation and wiring as specified and indicated on the Contract Drawings. Contractor shall provide all piping and isolation valves as specified and indicated on the Contract Drawings.

t. Remove and replace all pump station process piping insulation. CONTRACTOR shall be aware that piping insulation is known to consist of asbestos containing material and CONTRACTOR is directed to review Appendix D - Asbestos and Lead Report.

u. Prepare, prime, and paint, all piping and fittings. Piping where insulation is provided shall only need preparation and a primer coating.

v. Remove and replace existing pump station manual 10-ton crane to a motorized single girder crane with underhung hoist and radio controlled operation as specified and indicated on the Contract Drawings.

w. Remove and replace site chain link fencing as indicated on Contract Drawings. CONTRACTOR shall be responsible for supply and install of new swing gate, fencing, and posts necessary to complete the Work.

x. Furnish and install motorized site security gate and connection to security system as specified and indicated on Contract Drawings.

y. Complete all pump station and pipe testing including required pressure and leakage testing, chlorination, disinfection, and bacteriological sampling.

z. Remove and replace existing valve house concrete staircase and drain as indicated on Contract Drawings.

aa. Remove existing pump station overhead skylights; replace Pump Station and Valve House roofing with EPDM Roofing System as specified and indicated on the Contract Drawings.

bb. Complete exterior cleaning of the existing pump station building exterior. Supply all materials, equipment, and labor to variable pressure wash with compatible detergent by PROSOCO, Inc. or approved equal.

cc. Remove and replace Pump Station HVAC equipment as specified and indicated on the Contract Drawings.

dd. Removal of existing septic tank. Furnish and Installation of new septic tank and connection of new septic tank to existing leach field as specified and indicated on the Contract Drawings.

ee. Remove and replace doors and associated hardware on existing pump station building as specified and indicated in the Contract Documents.

ff. Demolish electrical power service, switchgear, power/control panels, power/control conduit and wiring as indicated on the Contact Drawings.

gg. Remove and replace wiring and lighting fixtures and switches as specified and indicated on the Contract Documents. CONTRACTOR shall be responsible for the supply and install of all materials, conduit core drills, wiring, de-energization, and equipment disconnects and reconnects.

hh. Demolish existing security system as indicated on the Contract Drawings.

ii. Demolish existing concrete sign located in the pump station front yard.

jj. Complete all excavation, backfill, grass and pavement restoration, site grading, and landscaping restoration as specified and indicated on the Contract Drawings.

2. Item 1B—New Generator Building Addition

a. Furnish building materials and install new brick and block generator building addition including new foundation, bedding, insulation, as shown on the Contract Drawings. Complete masonry and concrete connections to existing superstructure as indicated on the Contract Drawings. Outer brick facade shall match existing pump station color. Final brick selection shall be reviewed and approved by OWNER. Furnish and install new EPDM roofing system and roof drains on building addition.

b. Contractor shall purchase and supply one surplus cube of additional matched brick (525 bricks in approved color) to the OWNER for storage and future use.

c. Remove existing storm sewer, furnish, and install new storm sewer, storm sewer connections to existing pump station building, catch basins, and outlet to swales as specified and indicated on the Contract Drawings.

d. Furnish and install new HVAC equipment located within new building addition as specified and indicated on the Contract Drawings.

e. Prepare, prime, and paint interior wall faces, piping, and features of new building addition as specified and indicated on the Contract Drawings.

f. Furnish and install new electrical power service, switchgear, power/control panels, power/control conduit and wiring as specified and indicated on the Contact Drawings.

g. Furnish and install wiring and lighting fixtures and switches as specified and indicated on the Contract Documents. CONTRACTOR shall be responsible for the supply and install of all materials, conduit core drills, wiring, de-energization, and equipment disconnects and reconnects.

h. Furnish and install new 1500 kW backup power generator as specified and indicated on the Contact Drawings.

i. Furnish and install new Automatic Transfer Switch as specified and indicated on the Contact Drawings.

j. Furnish and install new portable load bank and docking station as specified and indicated on the Contact Drawings.

k. Furnish and install 3,697-gallon bulk diesel fuel storage tank, transfer pumping system, filtration system, diesel fuel day tank, fill port, and all associated fuel piping and accessories as specified and indicated on the Contact Drawings.

l. Furnish and install fire suppression and alarm system as specified and indicated on the Contact Drawings.

m. Furnish and install security system equipment on the generator building addition doors, existing station doors and site access security gate as specified and indicated on the Contract Drawings. Security System shall be coordinated directly with Stanley Security to ensure compatibility with OWNER's existing security services.

n. Furnish and install plumbing system and bathroom located within the new building extension as indicated on the Contract Drawings.

o. Supply and install fire extinguishers in accordance with Specification Section 10552, one within each room of the new generator building addition. Locations directed by Owner or Engineer.

p. Furnish and install wall mounted 2-bottle 32-ounce saline emergency eyewash station within the fuel storage room. Location directed by Owner or Engineer, manufactured in accordance with ANSI/ISEA Z358.1.

q. Furnish and install new access driveway, parking area, and the installation of new sidewalks as shown on the Contract Drawings.

3. Item 1C – Brick Repointing

a. Repointing of the brick masonry façade areas on the existing pump station building identified by OWNER/ENGINEER.

4. Item 1D – Brick Replacement

    a. Removal, replacement, and disposal of cracked or damaged brick on the existing pump station building identified by OWNER/ENGINEER

Item 2 – Cash Allowance

1. Item 2A - Cash Allowance for NYSEG Work

    a. Under this Item, the CONTRACTOR shall provide for NYSEG fee to furnish and install relocated utility service and associated equipment for power modifications for Guenther Pump Station.

2. Item 2B – Cash Allowance for PLC and SCADA System Work

    a. Under this Item, the CONTRACTOR shall furnish the RTU panel and related PLC and SCADA system work for Guenther Pump Station from Kaman Automation.

Item 3 – Contingency Allowance

    a. Under this Item, the CONTRACTOR shall provide additional Work where specifically ordered and directed by the ENGINEER, and which is entirely outside of the scope of work as defined in the Contract Documents. Only additional construction work specifically ordered and directed by the ENGINEER, and not shown or implied on the plans or specifications shall be included under this Item.

1.4 MODIFICATION

A. The right is reserved by the OWNER and the ENGINEER to make such changes in the order and execution of the Work to be done under these Specifications as, in the judgment of the ENGINEER, may be necessary or expedient to carry out the intent of the design of the Contract, and no increase in unit prices, if any, over the Contract rates will be paid the CONTRACTOR on account of such changes.

1.5 AVAILABLE DATA AND PHYSICAL DATA

A. The CONTRACTOR shall be required to be fully informed concerning the location of facilities and structures on, under, or over the project site, which may interfere with the operations of the CONTRACTOR, and it shall be assumed that the CONTRACTOR has prepared the bid and entered into the Contract in full understanding of the conditions to be encountered, and responsibility of the CONTRACTOR in connection therewith.

B. "As-Built" information for the existing facilities has been brought to the attention of the ENGINEER and is indicated on the Drawings. However, in some instances, information only from investigations and field surveys has been shown. The location of water, gas, electric, steam, or other utility lines, and the nature of the materials are not guaranteed. The indication on the drawings of such facilities shall not be assumed to relieve the CONTRACTOR of any responsibility with respect thereto; neither shall the OWNER nor the ENGINEER or OPERATOR be held responsible for any omission or failure to give notice to the CONTRACTOR of any other facility or structure on, under, or over the project site.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01131

SCHEDULE OF COMPLETION

PART 1 GENERAL

1.1 DESCRIPTION

A. CONTRACTOR shall perform the Work to achieve the Contract Times, Milestones, and specified completion requirements.

B. Schedule of Completion describes selected Milestones and completion requirements and is not intended to describe all the Work or its constraints, interrelationships, or sequential requirements.

C. Purpose of Milestones and completion requirements in the Schedule of Completion is to coordinate the Work with the required minimum operations at OWNER's facility.

1.2 MILESTONES

A. Milestone M1 - Pump and Genset Shop Drawing/Submittal –Approved

1. The General Work for Milestone M1 is the submittal for the four new horizontal split case pumps, variable frequency drives, diesel emergency engine generator, portable load bank system, and automatic transfer switch.

2. Milestone M1 includes completing all Work shown and specified with providing submittals/resubmittals as necessary to meet OWNER/ENGINEER approval including, but not limited to the following:

    a. 11304 – Horizontal Split Case Pumps
    b. 16232 – Diesel Emergency Engine Generator
    c. 16233 – Portable Load Bank System
    d. 16400 – Automatic Transfer Switch
    e. 16480 – Variable Frequency Drives

3. Milestone M1 is achieved when the CONTRACTOR provides the above listed shop drawings that are approved by OWNER/ENGINEER.

B. Milestone M2 – Building Addition Constructed and Rough Grading Complete

1. The General Area of Work for Milestone M2 is the Generator Building Addition and associated site grading.

2. Milestone M2 includes completing all Work shown and specified within the Generator Building Addition including, but not limited to the following improvements:

    a. Demolish the existing chemical building area, bathroom facilities, and wall area.
    b. Provide temporary openings, coverings, and bracing as required to complete improvements and removal and restoration of all temporary provisions.
    c. Complete all building architectural, structural, mechanical, plumbing (including fire suppression and alarm system), and electrical improvement work, so the building is operational and weather tight to accept generator system (Generator and Fuel System) and electrical room systems.
    d. Complete all rough grading associated with the Grading and Paving Plan (Sheet C003).

C. Milestone M3 – New Electrical System In Service

1. The General Work for Milestone M3 is the new electrical system including, but not limited to: the new electrical power service and electrical room systems, emergency generator, automatic transfer switch, fuel system, docking station, and variable frequency drives. Variable frequency drives connections shall be complete between power source and new RTU, wiring connections to pumps shall be completed to meet respective Milestones M4 and M5.

2. Milestone M3 includes completing all Work shown and specified with furnishing, installing, and making operational:

    a. 16232 – Diesel Emergency Engine Generator
    b. 16400 – Automatic Transfer Switch
    c. 16480 – Variable Frequency Drives

D. Milestone M4 – Two of Four Pumps (Pump Nos. 3 and 4) Installed and Operating

1. The General Area of Work for Milestone M4 is two of four new pumps (Nos. 3 and 4) installed.

2. Milestone M4 includes completing all Work shown and specified with two pumps including, but not limited to, the following improvements:

    a. Demolish two existing pumps and associated mechanical piping and valves. Install two new pumps, concrete foundation modifications, and associated mechanical piping and valves.
    b. Demolish associated electrical and control systems with the two pumps. Install new pump electrical and control systems for the associated two pumps.
    c. Successfully complete all start up and performance testing and performance period demonstration.
    d. Submit and complete Operation and Maintenance Manuals, Owner Training, and all performance testing reports.

E. Milestone M5 – Four of Four Pumps Installed and Operating

1. The General Area of Work for Milestone M5 is two remaining new pumps installed.

2. Milestone M5 includes completing all Work shown and specified with remaining pumps (Nos. 1, 2, and 5) including, but not limited to the following improvements:

    a. Demolish three remaining existing pumps and associated mechanical piping and valves. Install two new pumps, concrete foundation modifications, and associated mechanical piping and valves.
    b. Demolish associated electrical and control systems with the three pumps. Install new pump electrical and control systems for the associated pumps.
    c. Successfully complete all startup and performance testing and performance period demonstration.
    d. Submit all performance testing reports.

F. Milestone M6 – Full Generator Building Operational Testing

1. The General Area of Work for Milestone M6 is the Generator operational test on full building electrical load.

2. Milestone M6 includes completing all Work shown and specified with the generator systems including, but not limited to the following improvements:
    a. Provide new portable load bank, and connect any remaining building electrical equipment loads for operation and testing on the new generator.

b. Successfully complete all start up and performance testing with all new building electrical loads and portable load bank test.
c. Submit and complete Operation and Maintenance Manuals, Owner Training, and all performance testing reports.

1.3 SCHEDULE OF COMPLETION

A. The Schedule of Completion shall be:

SCHEDULE OF COMPLETION		
General Area of Work	**Activity Associated with Milestone or Completion Requirement**	**Contract Time[(1)]**
Pump and Genset Shop Drawing/Submittal - Approved	Milestone M1	90 days
Building Addition Constructed	Milestone M2	270 days
New Electrical System In Service	Milestone M3	510
Two of Four Pumps Installed and Operational	Milestone M4	540 days
Four of Four Pumps Installed and Operational	Milestone M5	630 days
Full Generator Building Operational Test	Milestone M6	660 days

[(1)]From CONTRACTOR Notice to Proceed.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01140

USE OF OWNER'S FACILITIES

PART 1 GENERAL

1.1 DESCRIPTION

A. Limit use of premises to the areas of Work and staging and parking areas indicated on Drawings. Do not disturb portions of Site beyond areas in which Work is indicated.

B. CONTRACTOR may use existing facilities or equipment in the new Work for construction purposes only if the OWNER'S written permission is obtained.

C. Restore existing facilities and equipment used for temporary purposes to original condition in a manner satisfactory to OWNER.

D. CONTRACTOR shall assume full responsibility for any damage that may result to existing or new facilities or equipment used for construction purposes and shall repair or replace any damaged facilities or equipment at CONTRACTOR's cost.

E. CONTRACTOR may utilize OWNER's existing crane at the Guenther Pump Station.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01210

ALLOWANCES

PART 1 GENERAL

1.1 SCOPE

A. This Section includes administrative and procedural requirements governing the following types of allowances:
   1. Cash allowances.
   2. Contingency allowances.

B. Authorization of Allowances:
   1. Work that will be done and paid under an allowance will be authorized in OWNER's written instruction to CONTRACTOR.
   2. Do not provide Work under an allowance without written authorization of OWNER.

1.2 CASH ALLOWANCES

A. Cash allowances are stipulated amounts for purchase of products, systems, or services. In addition to this Section, refer to General Conditions, as may be modified by the Supplementary Conditions; and individual Specification Sections for CONTRACTOR's costs to be covered by allowances, and CONTRACTOR's costs, including overhead and profit, to be included elsewhere in the Contract Price.

B. At earliest practical date after Notice to Proceed, advise ENGINEER of date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

C. Consult with ENGINEER in selecting suppliers and obtain proposals for price and time from selected suppliers. Submit proposals to ENGINEER along with recommendations relevant to furnishing and installing products covered in the allowance.

D. Purchase products or systems from suppliers selected by ENGINEER.

E. Submit invoices or delivery slips to show actual cost and quantity of products or systems delivered to Site and used in fulfilling each allowance.

F. Properly dispose of unused products and systems purchased under cash allowance.

G. For each allowance, submit to ENGINEER a Change Order proposal to adjust Contract Price for difference between specified allowance amount and actual cost. Prepare Change Order proposal in accordance with General Conditions as may be modified by the Supplementary Conditions, except that payment within limit of a cash allowance shall exclude cost of bond and insurance premiums.

1.3 CONTINGENCY ALLOWANCE

A. Contingency allowances are stipulated amounts available as reserve for sole use by OWNER to cover unanticipated costs.

B. When authorization of Work under contingency allowance is contemplated by OWNER for a defined scope, submit Change Order proposal to ENGINEER. Prepare Change Order proposal in accordance with the General Conditions as may be modified by the Supplementary Conditions, except that payments within limit of contingency allowance shall exclude cost of bond and insurance premiums.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 SCHEDULE OF ALLOWANCES

A. Cash Allowances:

1. Include an allowance of $60,000 for Bid Item 2A Cash Allowance for NYSEG Work.

2. Include an allowance of $25,000 for Bid Item 2B Cash Allowance for PLC and SCADA System Work. Following this specification section is Kaman Automation budget proposal for reference.

B. Contingency Allowances: Include a stipulated contingency allowance of $300,000 for Bid Item 3 Contingency Allowance for Extra Work for use in accordance with the OWNER's instruction to perform this work.

END OF SECTION

KAMAN
Automation, Control & Energy

MINARIK | ZELLER | OCE

Zeller Engineered Solutions
1000 University Ave
Rochester, NY 14607

P 585.254.6840
www.zellercorp.com

Mr. Matthew Skuse **November 4, 2020**
GHD
285 Delaware Avenue Suite 500
Buffalo New York 14202 USA

Subject: ECWA- Guenther Pump Station RTU Panel Budget

Matthew:

Per your request, please see the following budget quotation for the ECWA Guenther Pump Station RTU Panels. This quotation is based on the Drawings and Bill of Materials you provided via Email on 11/4/2020.

The documents of record are—***Guenther 2020 XLS Spreadsheet and Kaman-RTU Drawings***

1) Guenther Pump Station—48x36x12 to include: ***Budget Cost $16,500.00***

- Enclosure 48x36x12 with Mounting Feet
- M340 PLC with Processor and I/O as noted in documents
- 10" Proface HMI
- Quint Power Supply and UPS
- TVSS
- Ethernet Switch and cables
- Interior Light
- Duct, Terminal Blocks and Accessories as required and specified

Please Note: Cisco Equipment, GE MDS Radio and Antenna, Temp Transmitter and Intrusion Switch by others. They are not included in this proposal.

Delivery:
Approval Drawings 4- 6 weeks
Panel Manufacture 6-8 weeks

Terms & Conditions

- Shipping: FOB KAI Zeller Shipping Dock, Rochester, NY, 14607
- Invoicing: Net. 30 days
- Delivery: See above
- Purchase order acceptance is expressly based upon KAI Zeller Inc. standard terms and conditions.
- Warranty:

- Zeller guarantees all workmanship for a period of 12 months from date of shipment. Component Warranties are limited to that provided by the manufacturers—component warranties will be transferred to ECWA.

- Proposal is Valid for: 30 days

Thank you for your input and help with this issue. Please call me with any issues or concerns.

Best regards,

Pat Lockwood

Pat Lockwood
Account Manager
KAI Zeller, Inc.
PH: 716-863-6803
Email: pat.lockwood@kdgcorp.com

SECTION 01270

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Measurement and payment criteria applicable to the Work performed under a unit price or lump sum payment method.

B. Defect assessment and non-payment for rejected work.

1.2 RELATED SECTIONS

A. Section 01010 - Summary of Work.

1.3 AUTHORITY

A. Measurement methods delineated in the individual specification sections complement the criteria of this Section. In the event of conflict, the requirements of the individual Specification Section will govern.

B. Take all measurements and compute quantities. The ENGINEER will verify measurements and quantities.

C. Assist by providing necessary equipment, workers, and/or survey personnel as required.

1.4 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Form are for bidding, contract purposes, and comparison of the bids only. Actual quantities and measurements supplied or placed in the Work and verified by the ENGINEER determine actual payment.

B. If the actual Work requires more or fewer quantities than those quantities indicated, provide the required quantities at the unit sum/prices contracted.

C. The OWNER does not expressly or by implication agree that the nature of the materials encountered below the surface of the ground or the actual quantities of material encountered or required will correspond therewith and reserves the right to increase or decrease any quantity or to eliminate any quantity as OWNER may deem necessary.

1.5 MEASUREMENT OF QUANTITIES

A. Measurement Devices:

1. Weigh Scales: Inspected, tested, and certified by the State of New York Bureau of Weights and Measures within the last 18 months.

2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.

3. Metering Devices: Inspected, tested, and certified by the State of New York Bureau of Weights and Measures within the last 18 months.

B. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel, or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.

C. Measurement by Volume: Measured by cubic dimensions using mean length, width, and height or thickness.

D. Measurement by Area: Measured by square dimension using mean length and width or radius.

E. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

F. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as a completed item or unit of Work.

1.6 PAYMENT

A. Payment Includes: Full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

B. No direct or separate payment will be made for providing miscellaneous temporary or accessory works, plant services, field offices of the CONTRACTOR or ENGINEER, layout surveys, job signs, sanitary requirements, testing, safety devices, approval and record drawings, water supplies, power, removal of waste, watchmen, bonds, insurance, and all other requirements of the General Conditions, Special Conditions, and the General Requirements. Compensation for all such services and materials shall be included in the prices stipulated for the lump sum and unit price items listed herein.

C. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the ENGINEER multiplied by the unit price for the Work, which is incorporated in or made necessary by the Work.

1.7 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of the ENGINEER, it is not practical to remove and replace the Work, the ENGINEER will direct one of the following remedies:

1. The defective Work may remain, but the unit price will be a new unit price at the discretion of the OWNER and ENGINEER.

2. The defective Work will be partially repaired to the instructions of the ENGINEER, and the unit price will be adjusted to a new unit price at the discretion of the OWNER and ENGINEER.

C. The individual specification sections may modify these options or may identify a specific formula or percentage price reduction.

D. The authority of the ENGINEER to assess the defect and identify payment adjustment is final.

1.8 NON-PAYMENT FOR REJECTED PRODUCTS

A. Payment will not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable.

2. Products determined as unacceptable before or after placement.

3. Products not completely unloaded from the transporting vehicle.

4. Products placed beyond the lines and levels of the required Work.

5. Products remaining on hand after completion of the Work.

6. Loading, hauling, and disposing of rejected Products.

1.9 SCHEDULE OF PAY ITEMS

A. Contract 1 – General Contract

1. Item 1 – Pump Station Rehabilitation

Item 1A- Existing Building Improvements

Work under this Item shall generally be as specified in Section 01010, Summary of Work, as defined in these Contract Documents, and as shown on the Contract Drawings. The cost of required insurance, bonds, permits, work schedule and subsequent updates and any other initiation of the Contract work is also included in this Item.

Measurement: The GENERAL CONTRACTOR lump sum price for Pump Station Rehabilitation reflects the actual value of the work involved. The quantity to be paid for under this Item will be made on a lump sum basis in proportion to the amount of Work completed.

Payment: Payment for the work on the Existing Building Improvements will be made at the GENERAL CONTRACTOR's bid, as stated in the bid. The amount bid shall be made payable to the GENERAL CONTRACTOR whenever he shall have completed five percent (5%) of the Contract work. Five percent (5%) of the work shall be considered completed when the total of payments earned, as reflected by estimates of work done, not including the amount bid for this item, nor payments for materials delivered to the site, exceeds five percent (5%) of the total amount of the bid for this Contract. The lump sum price bid for this Item shall be full compensation as shown and specified.

Item 1B- New Generator Building Addition

Work under this Item shall generally be as specified in Section 01010, Summary of Work, as defined in these Contract Documents, and as shown on the Contract Drawings. The cost of required insurance, bonds, permits, work schedule and subsequent updates and any other initiation of the Contract work is also included in this Item.

Measurement: The GENERAL CONTRACTOR lump sum price for New Generator Building Addition reflects the actual value of the work involved. The quantity to be paid for under this Item will be made on a lump sum basis in proportion to the amount of Work completed.

Payment: Payment for the work completed of the New Generator Building addition will be made at the GENERAL CONTRACTOR's bid, as stated in the bid. The amount bid shall be made payable to the GENERAL CONTRACTOR whenever he shall have completed five percent (5%) of the Contract

work. Five percent (5%) of the work shall be considered completed when the total of payments earned, as reflected by estimates of work done, not including the amount bid for this item, nor payments for materials delivered to the site, exceeds five percent (5%) of the total amount of the bid for this Contract. The lump sum price bid for this Item shall be full compensation as shown and specified.

Item 1C- Brick Repointing

Work under this Item shall generally be as specified in Section 01010, Summary of Work, as defined in these Contract Documents, and as shown on the Contract Drawings. The cost of required insurance, bonds, permits, work schedule and subsequent updates and any other initiation of the Contract work is also included in this Item.

Measurement: The quantity to be paid for under this Item will be made on a per linear foot basis.

Payment: The unit price for this Item shall be full compensation per each linear foot of brick repointing installed as shown and specified.

Item 1D- Brick Replacement

Work under this Item shall generally be as specified in Section 01010, Summary of Work, as defined in these Contract Documents, and as shown on the Contract Drawings. The cost of required insurance, bonds, permits, work schedule and subsequent updates and any other initiation of the Contract work is also included in this Item.

Measurement: The quantity to be paid for under this Item will be made on a per-each basis.

Payment: The unit price for this Item shall be full compensation per each brick installed as shown and specified.

2. Item 2 – Cash Allowance

Item 2A - Cash Allowance for NYSEG Work

This allowance is to cover the cost of work by NYSEG for power modifications at the Guenther Pump Station. The GENERAL CONTRACTOR will only receive payment under this item for the actual cost from NYSEG to complete their required work.

Item 2B– Cash Allowance for PLC and SCADA System Work

This allowance is to cover the cost of work by OWNER system integrator Kaman Automation to furnish a complete RTU panel and related PLC and SCADA system work to OWNER for Guenther Pump Station. The GENERAL CONTRACTOR will only receive payment under this item for the actual cost from Kaman Automation to complete their required work.

3. Item 3 – Contingency Allowance

The allowance is to cover the cost of extra work items as directed by the ENGINEER over and above the Work shown and specified in these Contract Documents. The GENERAL CONTRACTOR will only receive payment under this Item for actual extra Work performed as approved in writing and directed by the ENGINEER and may not receive all or part of the total amount of this Item if the value of this extra Work is less than the allowance value.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01290

SCHEDULE OF VALUES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Schedule of Values preparation and submission.

1.2 EXPLANATION

A. The Schedule of Values is an itemized list that establishes the value or cost of each part of the Work. It shall be used as the basis for preparing progress payments and may be used as a basis for negotiations concerning additional Work or credits, which may arise during the construction. Quantities and unit prices may be included in the schedule when approved by or required by the ENGINEER.

1.3 PREPARATION

A. Schedule shall show breakdown of labor, materials, equipment, and other costs used in preparation of the Bid.

B. Costs shall be in sufficient detail to indicate separate amounts for each Section of the Specifications.

C. The CONTRACTOR may include an item for bond, temporary facilities, and job mobilization.

D. Schedule of Values shall be prepared on 8-1/2-inch by 11-inch white paper.

E. Use Table of Contents of this Specification as basis for Schedule formats and identify each item with number and title in the Table of Contents.

F. When requested by ENGINEER, support values with data that will substantiate their correctness.

G. The sum of the individual values shown on the Schedule of Values must equal the total lump sum Contract Price.

H. The manner in which overhead and profit are shown shall be approved by the ENGINEER.

I. Schedule shall show the purchase costs for materials and equipment to be stored on site prior to installation that the CONTRACTOR anticipates payment will be requested for prior to their installation.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 SUBMISSION

A. Submit two (2) copies of schedule to ENGINEER for approval before Work commences on the site. After review by ENGINEER, revise and resubmit Schedule as required until it is approved.

B. No partial payment will be considered for payment prior to acceptance of the Schedule of Values by the ENGINEER and OWNER.

END OF SECTION

SECTION 01300

PROGRESS SCHEDULES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Format.

B. Content.

C. Revisions to schedules.

D. Submittals.

E. Distribution.

1.2 RELATED SECTIONS – NOT USED

1.3 FORMAT

A. Prepare schedules as a horizontal bar chart with separate bar for each major portion of Work or operation, identifying first workday of each week. Schedule will be created on computer using Microsoft Project, latest version.

B. The CONTRACTOR may prepare a network analysis system using the critical path method as approved by the ENGINEER.

C. Sequence of Listings: The Table of Contents of this Specification OR the chronological order of the start of each item of Work.

D. Scale and Spacing: To provide space for notations and revisions.

E. Sheet Size: Minimum 8-1/2 by 11 inches, maximum 11 by 17 inches.

1.4 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of the construction.

B. Identify each item by Specification Section number.

C. Identify Work in logically grouped activities.

D. Provide sub-schedules to define critical portions of the entire schedule.

E. Provide sub-schedules for each stage of Work.

F. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

G. Provide separate schedule of submittal dates for shop drawings, product data, and samples, including any OWNER furnished products if applicable, and dates reviewed submittals will be required from the ENGINEER. Indicate decision dates for selection of finishes by the OWNER.

H. Indicate delivery dates of all products identified under Allowances.

I. Coordinate content with Section 01290 - Schedule of Values.

1.5 REVISIONS TO SCHEDULES

A. Indicate progress of each activity to date of submittal, and projected completion date of each activity.

B. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

C. Provide narrative report to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken, or proposed, and its effect including the effect of changes on schedules of separate CONTRACTORS if applicable.

1.6 SUBMITTALS

A. Submit initial schedules within thirty (30) days after the Notice of Award. After review, resubmit required revised data within ten (10) days.

B. Submit revised Progress Schedules with each Application for Payment.

C. Submit PDF file(s) of the schedule, which will be retained by the ENGINEER.

1.7 DISTRIBUTION

A. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in the schedules.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01311

COORDINATION WITH OWNER'S OPERATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. CONTRACTOR services and required documentation for ensuring that the OWNER's operations are maintained as required during the duration of the Project.

B. Minimum construction tasks to be addressed by the CONTRACTOR relative to coordination with the OWNER's operations and other Contractors working on the Site concurrently.

C. OWNER's coordination, construction sequencing, and scheduling requirements for the CONTRACTOR during execution of the Work.

1.2 RELATED SECTIONS

A. Section 01010 – Summary of Work.

B. Section 01131 – Schedule of Completion.

1.3 BACKGROUND INFORMATION

A. The Work under this Contract involves upgrades and improvements to existing water system facilities owned, operated, and maintained by the Erie County Water Authority (OWNER). The existing water system is an essential component of industries and residents' normal life; therefore, the existing water system must be maintained in continuous operation at all times during the course of the Work under this Contract, except as noted within this Section. No shutdown periods shall be permitted under this Contract, except as and when directed by the OWNER and ENGINEER.

B. Any process interruption must be scheduled and coordinated with the OWNER to ensure that no lapses in operation occur. It is the CONTRACTOR's responsibility to develop a work plan and schedule detailing, at a minimum, the procedures to be employed, the equipment and materials to be used, the safety plan to be used during the Work, coordination with Work covered under other Contracts, and a schedule defining the duration of the Work with milestone subtasks.

C. When shutting down any process or piece of equipment, the CONTRACTOR shall confirm the following:

1. All labor, equipment, and material are in place and ready for installation, except as noted within this Section.

2. The CONTRACTOR shall make any and all preparations to ensure that the duration of equipment outages and system interruptions are kept to an absolute minimum. At a minimum - a schedule, a detailed sequence of work activities, and verification that all required equipment and materials are on site shall be documented. This documentation shall be reviewed with the OWNER and the ENGINEER prior to the request for interruptions in service.

3. The CONTRACTOR shall provide the OWNER and ENGINEER with written notice ten (10) days prior to any proposed interruption at the pump station site.

4. The CONTRACTOR shall coordinate all equipment shutdowns with the OWNER.

5. The OWNER will operate all existing equipment and valves for isolating or removing equipment or processes from service. The CONTRACTOR is responsible for locking out / tagging out all equipment, in coordination with the OWNER's procedures. The OWNER does not guarantee a seal-tight connection upon closing of existing valves.

6. The OWNER will operate existing electrical switches, breakers, disconnects, and other electrical equipment, unless otherwise directed by the OWNER and ENGINEER. No shutdowns of electrical service shall occur without OWNER's knowledge. OWNER does not guarantee the operation of any item of equipment.

7. All operations of new equipment including, but not limited to, pumping systems, electrical systems, and new valves, shall be performed by the OWNER once they have been placed in service unless otherwise directed by the OWNER and ENGINEER. No shutdowns of equipment or pumps shall occur without OWNER's knowledge.

8. OWNER shall drain the ground water storage tank to floor level prior to the CONTRACTOR performing any process piping or valve work within the valve house. CONTRACTOR shall pump any remaining water to facilitate the work. CONTRACTOR shall be responsible for providing the ground water storage tank in a clean condition at the end of their operations as specified in Section 15140.

9. These constraints apply to coordination with OWNER's operations:

    a. Operational Access: OWNER'S personnel shall have access to areas that remain in operation. All operation of existing equipment and valves required for shutdowns and bypasses shall be done by OWNER. All operation of existing electrical equipment required for shutdowns shall be done by OWNER, unless otherwise directed by OWNER or ENGINEER.

    b. CONTRACTOR shall schedule and perform start-ups for Monday through Thursday. Equipment and systems shall not be placed into operation on Friday, Saturday, Sunday, and OWNER holidays without prior approval of OWNER.

    c. Dead End Valves or Pipe: CONTRACTOR shall provide blind flanges, watertight bulkheads, or restrained valves at the temporary or permanent terminus of a pipe or conduit. Blind flanges and bulkheads shall be suitable for the service and braced and blocked, as required or as directed by ENGINEER. Temporary valves shall be suitable for the service. Where a valve is provided at a permanent terminus of a pipe, also provide on the downstream side of the valve a blind flange with a drain/flushing connection.

    d. Equipment and material removals shall be made with caution to prevent damage to existing facilities.

    e. The CONTRACTOR is responsible for removing any remaining water in the pipes, as necessary for their construction operations.

10. The CONTRACTOR shall be prepared to stop work and return the process or equipment to service upon request from the OWNER based upon, but not limited to, weather, water demand, or emergency conditions occurring in the OWNER's water system. The OWNER's discretion shall dictate the conditions under which offline equipment or facilities are to be returned to service, but the OWNER will make reasonable requests so as not to unduly impede the progress of the Work. Time is of the essence in completing the proposed improvements. No additional payment will be made to the CONTRACTOR for Work necessary to return equipment to service.

11. Access to perform the Work will require proper regulatory Health and Safety measures to be in place prior to commencing work. Any equipment necessary to gain access to the Work shall be the responsibility of the CONTRACTOR and shall be approved by the OWNER and ENGINEER, prior to use.

12. The CONTRACTOR shall be responsible for dewatering operation provisions, as required or further described in these specifications.

13. The CONTRACTOR shall be prepared to work during nights and weekends, as required, to complete the Work, as per the specified timeframes stipulated herein, at no additional cost to the OWNER.

14. Limitations to pump station interruptions are listed in the schedule at the end of this section. Wherever possible, tie-ins for each area shall be combined to minimize the number of shutdowns. The CONTRACTOR shall coordinate shutdowns with the OWNER and determine sequencing and scheduling within the constraints noted below.

1.4 COORDINATION

A. The CONTRACTOR shall be responsible for overall coordination and scheduling of Work performed.

B. Work shall be performed in the specified sequence. Certain phases of the Work may require working 24-hour days or work during hours outside of regular business hours. Work may be accelerated from a later stage to an earlier stage if OWNER's operations are not adversely affected by the proposed sequence change, with ENGINEER's acceptance.

C. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate Work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment. Protect existing and new electrical equipment from dust and dirt.

D. Coordinate space requirements and installation of mechanical, heating and ventilation, and electrical work, which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas, unless indicated otherwise, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. The CONTRACTOR shall not be responsible for damage done by Contractors not under their jurisdiction. The CONTRACTOR will not be liable for any such loss or damage unless it is through the negligence of the CONTRACTOR or their subcontractors.

G. The CONTRACTOR shall maintain sufficient competent personnel, drafting equipment, and supplies for the purpose of preparing layout and coordination drawings. These drawings shall supplement the Contract Documents, and the Shop Drawings, as necessary to correlate the work of various trades. Where such drawings are to be prepared by the mechanical, electrical, or other Subcontractors, CONTRACTOR will ensure that each Subcontractor maintains the required personnel and facilities at the site.

H. Coordinate completion and cleanup of Work of separate sections in preparation for Substantial Completion.

I. The CONTRACTOR shall coordinate with the OWNER for making operational changes.

J. All new equipment must be fabricated, on-site, and prepared for installation before initiation of any process shutdown/interruption, except as noted within this Section.

K. The CONTRACTOR is responsible for coordinating the completion of the work on all parts of each system, such that, the start-up is not delayed and can be completed with all parts.

L. The CONTRACTOR is responsible for locking and unlocking the site security gate at the beginning and end of each workday.

M. CONTRACTOR has the option, subject to approval of ENGINEER and OWNER, of providing additional temporary facilities that can eliminate or mitigate a constraint without additional cost to the OWNER, provided it does not present hazards to personnel, structures, and equipment, that it does not adversely affect the OWNER's ability to comply with permits and operating requirements, does not generate odors and other nuisances, and that requirements of the Contract Documents are fulfilled.

1.5 SUBMITTALS

A. Substitute Sequence and Shutdown Work Plan Submittal: Provide a submittal to ENGINEER explaining in detail the proposed sequence, system shutdowns, and explain in detail any change and its effects, including evidence that OWNER's operations will not be adversely affected by the proposed change. List benefits of the proposed sequence or shutdown change, including benefits to the Progress Schedule.

B. Sequence and Shutdown Work Plan Submittals:

1. CONTRACTOR shall prepare an inventory of labor and materials required to perform the sequences, shutdowns, and tie-in tasks, an estimate of the time required for the shutdown including time for OWNER to take down and start up existing equipment, systems, or piping, and a written description of steps required to complete the Work associated with the sequence and shutdown.

    a. For work within Pump Station: CONTRACTOR shall inform OWNER and ENGINEER of how equipment and materials are intended to be staged into and out of the areas. For purposes of bidding, CONTRACTOR shall provide the means and methods for all equipment and materials to enter and leave the facilities through existing openings (i.e. doors or hatches). If CONTRACTOR desires to make any temporary openings in existing structures, they shall submit a written request for review and approval by OWNER and ENGINEER. CONTRACTOR shall be responsible for closing all temporary openings to a watertight condition as solely determined by the OWNER and ENGINEER. The OWNER does not guarantee the availability or condition of any existing monorail, crane, or lifting eyes.

    b. For work within the Valve House: CONTRACTOR shall provide for removal of the roofing system and decking for removal of equipment and materials. If CONTRACTOR desires to make any temporary openings in existing structures, they shall submit a written request for review and approval by OWNER and ENGINEER. CONTRACTOR shall be responsible for closing all temporary openings to a watertight condition as solely determined by the OWNER and ENGINEER. The OWNER does not guarantee the availability or condition of any existing monorail, crane, or lifting eyes.

    c. Submittals shall also document CONTRACTOR's temporary controls including, but not limited to, dust control to prevent migration of dust and debris into adjacent areas, and temporary stockpiling of soils. Submit the inventory, time estimate, written procedures, and proposed date(s) of the shutdown to the ENGINEER for review at least 20 calendar days prior to the proposed shutdown start date. Do not start shutdown until the OWNER and ENGINEER accept the sequence and shutdown work plan submittal.

2. Shutdown Notification: After acceptance of shutdown planning submittal and prior to the shutdown, provide written notification to OWNER and ENGINEER of the date and time at which the CONTRACTOR will be ready to perform the Work associated with each shutdown. Provide OWNER and ENGINEER notification at least 10 days in advance of each shutdown. OWNER and ENGINEER will confirm with the CONTRACTOR that they are prepared to conduct the shutdown and the anticipated date of the start of the shutdown.

1.6 SEQUENCE OF CONSTRUCTION

A. The sequence of construction proposed by the CONTRACTOR shall be included as part of the work plan documenting sequence and shutdown planning and must meet the following minimum criteria:

1. Achieves the desired results of the Project.

2. Is in accordance with the stipulated Contract Time of Completion.

3. Is mutually agreeable to all parties involved.

4. The minimum stated equipment must remain operational at all times.

5. Provides startup without the possibility of damage to equipment or systems.

B. The OWNER and ENGINEER shall review the sequence of construction proposed by the CONTRACTOR. If the ENGINEER and OWNER determine that said proposal adequately meets the criteria set forth in these specifications, the ENGINEER and OWNER shall grant limited acceptance of the sequence of construction proposed by the CONTRACTOR.

C. Regardless of the sequence of construction proposed by the CONTRACTOR, the CONTRACTOR shall be solely responsible for determining the order, means, methods, staffing, and scheduling necessary to satisfy the Work requirements outlined within these Contract Documents.

1.7 SCHEDULING

A. Guenther Pump Station Rehabilitation

1. The CONTRACTOR shall coordinate work with the OWNER. Facility shutdowns and isolations must be scheduled and coordinated with the OWNER.

2. The CONTRACTOR shall coordinate the piping and valve installations/replacements with the OWNER. Piping isolations, tank draining, and pump station shutdowns must be scheduled and coordinated with the OWNER. Work shall be scheduled, so that shutdowns and tank draining are limited to the minimum amount possible throughout the duration of the project.

3. Isolation of the pump station and tank from the bypass chamber and distribution system shall be by CONTACTOR utilizing temporary line stop valves. Main header pump station valves (BFV-7, BFV-9, and BFV-17) shall be replaced during the use of the temporary line stop valves, so the new valves can be utilized to isolate the tank and/or pump station under pump replacement milestones.

4. The Guenther Tank shall be drained to allow for valve house piping and valve replacement.

5. Existing Pump Station Pump Nos. 3 and 4 may be decommissioned once the temporary line stops are installed. Existing Pump Station Pump Nos. 3 and 4 are not needed from Memorial Day to Labor Day. New Pumps are not required to be on site prior to demolition of existing Pump Nos. 3 and 4.

6. At a minimum, the Pump Station Pump Nos. 1 and 2, tank, valve house, and bypass chamber valve shall be fully operational from Memorial Day through Labor Day.

7. Replacement of the existing pumps shall be staged so that at least two pumps are available to pump required flows after all scheduled shutdowns. No more than two pumps shall be out of service at a given time. The replacement of existing pumps No. 3 and 4 will be completed first, followed by the replacement of pumps No. 1 and 2 and then followed by removal of pump No. 5 and installation of surge relief valve (SR-5) and piping.

8. Water **must** flow through the operational pump station or through the bypass chamber during all work and shutdown sequences.

9. After the replacement of two existing pumps, CONTRACTOR cannot begin replacement of the remaining two pumps until demonstrating a consecutive 2-week period without any process interruptions.

10. Replacement of the station bypass valve can only begin after the successful replacement and testing of all four new pumps and all new pump station valves. CONTRACTOR must demonstrate a consecutive 2-week period of successful pump station operation before work can begin on the station bypass valve replacement.

11. Bypass chamber isolation valve shall only be out of service to complete the bypass valve replacement. One shutdown shall be allowed and utilize existing Bypass chamber isolation valves to perform valve replacement.

1.8 SHUTDOWNS

A. General:

1. A shutdown is defined as when a portion of the normal operation of OWNER's facility, whether equipment, systems, or pipeline, has to be temporarily suspended or taken out of service to perform the Work.

2. Work that may interrupt normal operations shall be accomplished at times convenient to OWNER.

3. The CONTRACTOR may be limited to a specific period of time for the shutdown, and/or non-standard working hours or the shutdown may be postponed for any amount of time so not to interfere with the production and/or pumping of water.

4. Provide at the Site in close proximity to the shutdown and tie-in work areas tools, equipment, spare parts and materials, both temporary and permanent, necessary to successfully complete the shutdown. Prefabrication of piping and other assemblies shall be completed to the degree possible prior to their associated shutdown. Demonstrate to ENGINEER's satisfaction that CONTRACTOR has complied with these requirements before starting shutdown.

5. CONTRACTOR shall complete all work associated with a shutdown in one continuous period.

6. If CONTRACTOR's operations cause an unscheduled interruption of OWNER'S operations, CONTRACTOR shall immediately re-establish satisfactory operation for OWNER.

7. Unscheduled shutdowns or interruptions of continued safe and satisfactory operation of OWNER's facilities that result in fines or penalties by authorities having jurisdiction shall be the responsibility of CONTRACTOR if, in the ENGINEER's opinion, the CONTRACTOR caused the unscheduled shutdown or interruption.

8. If during the shutdown period, the OWNER has to put the existing facilities back into service due to an unforeseen emergency situation, the CONTRACTOR may be ordered to work 24-hour days until the facilities are back in service. The CONTRACTOR shall cooperate fully with the OWNER to immediately place the facilities back in service.

9. When applicable, work requiring service interruptions for tie-ins shall be performed during the scheduled shutdowns.

B. Shutdowns of Electrical Systems: Comply with the National Electric Code. CONTRACTOR shall lock out and tag circuit breakers and switches operated by OWNER and shall check cables and wires to verify that they are de-energized to ground potential before Work is started. Upon completion of Work associated with the shutdown, CONTRACTOR shall remove the locks and tags and notify ENGINEER that the facilities are available for use.

C. Summary Schedule/Tie-in Table

SCHEDULE OF SHUTDOWNS AND TIE-INS

Schedule Sequence No.	Shutdown/Tie-in Location	Action/New Facilities and Service	Existing (Connecting) Facilities and Service	Required Sequence	Milestone[(1)]	Maximum Duration
1	Yard Piping	Temporary Line Stop Valves	Pump Station Inlet and Pump Station Outlet (upstream of Venturi meter)	Prior to any shutdowns	NA	0 hrs.
2	Existing Pump Nos. 3 and 4	Decommissioning of Existing Pump Nos. 3 and 4	Pump Station Branch Piping	After schedule item No. 1	Tied to M4	Complete prior to Item No. 7
3	Pump Station - Valves BFV-7, BFV-17, and BFV-19 /All Valve House Valves	Installation of Valves BFV-7, BFV-17, and BFV-19	Tank, Distribution System, and Pump Station	Prior to Schedule Item No. 4	NA	Complete prior to item No. 4
4	Pump Station - Valves BFV-33, BFV-5 (motorized), BFV-6 (motorized), and MBFV-2	Installation of Valves BFV-33, BFV-5 (motorized), BFV-6 (motorized), and MBFV-2	Tank and Pump Station	Prior to Schedule Item No. 5	NA	Complete prior to item No. 5
5	Pump Station - BFV-12 and BFV-18	Installation of BFV-12 and BFV-18	Pump Station Pumps	Prior to Pump Replacement Milestones	NA	Complete prior to item No. 7
6	New Electrical System	New Electrical Service and System (Transformer, Generator, ATS, VFDs, etc.)	Electrical	Prior to Pump Replacement	M3	Complete prior to schedule item No. 7

Schedule Sequence No.	Shutdown/Tie-in Location	Action/New Facilities and Service	Existing (Connecting) Facilities and Service	Required Sequence	Milestone[(1)]	Maximum Duration
7	Pump Station - Pump Nos. 3 and 4	Pump Nos. 3 and 4 Installed and Operating	Suction Header to Discharge Header	After Schedule item No. 5	M4	Complete prior to schedule item No. 8
8	Pump Station - Pump Nos. 1 and 2	Pump Nos. 1 and 2 Installed and Operating	Suction Header to Discharge Header	After schedule item No. 6	M5	Complete prior to schedule item No. 9
9	Bypass Chamber	Bypass Valve (MBFV-1) Replacement	Distribution System	After schedule item No. 7	Substantial Completion	3 days

[(1)]M3 & M4 = refer to section 01131 Schedule of Completion for milestone details

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 GENERAL

A. Verify that existing site conditions are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Verify that utility services are available, of the correct characteristics, and in the correct location.

E. The information within this Section provides general sequence of work requirements, constraints, and allowed shutdown times pertaining to the Work. The information is not intended to reflect means and methods, but provide a sequence, based on constraints and shutdown limitations, to accomplish the Work within the specified Contract Time. The CONTRACTOR shall develop a sequence of work and corresponding Construction Schedule, incorporating the constraints and shutdown limitations, to complete the work within the specified Contract Time. The means and methods to meet the Contract Times shall be accounted for in the CONTRACTOR's bid. Failure to account for constraints shall not be cause for delay or additional cost to the OWNER.

F. The CONTRACTOR is ultimately responsible for their means and methods and safety programs associated with the Work.

END OF SECTION

SECTION 01312

PRECONSTRUCTION CONFERENCE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preconstruction conference requirements.

1.2 RELATED SECTIONS

A. Section 01313 - Progress Meetings.

1.3 PRECONSTRUCTION CONFERENCE

A. Date, Time, and Location: Conference will be held after execution of the Contract and before construction work begins at the site. ENGINEER will fix the date, time, and location of the meeting.

B. ENGINEER shall prepare agenda, preside at meeting, and prepare and distribute transcript to all parties.

C. CONTRACTOR shall provide data required and be prepared to discuss all items on agenda.

1.4 REQUIRED ATTENDANCE

A. CONTRACTOR and major Subcontractors.

B. OWNER.

C. ENGINEER.

D. Utility Representatives, as necessary.

E. Representatives of government agencies having any form of control, if available.

1.5 MINIMUM AGENDA

A. Designation of responsible personnel.

B. Subcontractors.

C. Coordination with ECWA.

D. Coordination with other CONTRACTORS.

E. Construction schedule.

F. Processing of Shop Drawings.

G. Processing of field decisions and Change Orders.

H. Requirements for copies of Contract Documents.

I. Insurance in force.

J. Schedule of Values.

K. Schedule of Payments.

L. Use of premises.

M. Safety and first aid procedures.

N. Security.

O. Housekeeping.

P. Field Offices.

Q. Record Drawings.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01313

PROGRESS MEETINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Progress meetings.

1.2 RELATED SECTIONS

A. Section 01312 - Preconstruction Conference.

1.3 PROGRESS MEETINGS

A. Date and Time:

1. Regular Meeting - As mutually agreed upon by ENGINEER and CONTRACTOR.

2. Other Meetings - On call.

B. Place –Guenther Pump Station Site, or other mutually agreed location.

C. ENGINEER shall prepare agenda, preside at meetings, prepare minutes of proceedings, and distribute copies of transcript.

D. CONTRACTOR shall provide data required and be prepared to discuss all items on agenda.

1.4 MINIMUM ATTENDANCE

A. CONTRACTOR or his superintendent. The representative of the CONTRACTOR shall be able to make binding decisions regarding the Work.

B. ENGINEER.

C. OWNER’s Representative.

D. Any Subcontractors, materialmen, or vendors whose presence is deemed necessary by the OWNER, ENGINEER, or CONTRACTOR.

1.5 MINIMUM AGENDA

A. Minutes of previous meeting.

B. Progress since last meeting.

C. Planned progress for next period.

D. Problems.

E. Coordination among GC, subcontractors, and OWNER.

F. Change Orders.

G. Applications for payment.

H. Observations by ENGINEER.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01321

CONSTRUCTION SCHEDULES

PART 1 GENERAL

1.1 DESCRIPTION

A. Provide construction schedule, which conforms to the requirements below, unless otherwise approved by ENGINEER.

B. Update schedules every month and for progress meetings unless otherwise specified or directed by ENGINEER.

C. Submit cash flow schedule with each updated construction schedule.

1.2 CONTENT

A. Shop drawing submittal dates and required approval dates.

B. Product delivery dates.

C. Factory and field testing dates.

D. Dates for beginning and completing each phase of the Work by activity and by trades.

E. Cash flow schedule shall be based on monthly cash flow.

1.3 FORMAT

A. Schedule will be created on computer using Microsoft Project, latest version.

B. Type: Horizontal bar chart.

C. Sheet Size: 11 inch by 17 inch, up to 24 inch by 36 inch.

D. Time Scale: Indicate first date in each workweek.

E. Organization:

1. Group shop drawing submittals and reviews into a separate sub-schedule.
2. Group product deliveries into a separate sub-schedule.
3. Group construction work into a separate sub-schedule by activity.
4. Group critical activities, which dictate the rate of progress into a separate sub-schedule.
5. Organize each sub-schedule by Specification Section number.

F. Activity Designations: Show title and related Specification Section number.

G. Provide electronic copies of project schedule to ENGINEER in PDF format by email or on a CD, as requested.

H. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, duration, and milestone dates.

I. Indicate estimated percentage of completion for each item of Work at each progress meeting.

J. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and under Allowances.

1.4 SUBMITTALS

A. Submit initial schedule at least 20 days prior to submitting first application for a progress payment but no later than 10 days after date of execution of Agreement. Subsequent schedule updates shall be submitted concurrently with monthly payment applications.

B. Submit updated schedules at all progress meetings. If a schedule remains unchanged from one period to the next, submit a written notice to that effect. Updated schedules shall show progress completed to date.

C. Make submittals to ENGINEER, three copies of all requirements.

D. Unless otherwise specified, submit three paper copies of each schedule and one CD. One copy each will be reviewed by the OWNER and ENGINEER and returned. The other copy will be retained by the ENGINEER.

E. Attach a letter of transmittal to each submittal and include the following information in the letter:

1. A listing of items, which have changed since the last submittal.
2. Discussion of problems causing delays, anticipated length of delays, and proposed countermeasures.

F. Submit updated cash flow schedule based on each updated schedule.

Payment of partial estimates shall not be made unless the CONTRACTOR has, in force, an approved construction schedule.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01322

CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.1 DESCRIPTION

A. CONTRACTOR shall provide photographic documentation for the following:
   1. Pre-construction.
   2. Construction progress.
   3. Final.

1.2 CONSTRUCTION PHOTOGRAPHS

A. Digital construction photographs shall be taken at each of the major stages on construction listed below and shall be furnished to ENGINEER and OWNER with each Application for Payment:
   1. Site before mobilization.
   2. Completion of underground facilities prior to backfilling.
   3. Completion of site clearing for each structure.
   4. Completion of excavations for each structure.
   5. Completion of reinforcing and formwork prior to concrete pours.
   6. Completion of foundations of each structure.
   7. Completion of framing of each structure.
   8. Completion of enclosure for each structure.
   9. Installation of all interior and exposed exterior piping, equipment, and electrical components.
   10. Testing of all piping, equipment, and systems.
   11. Completion of site restoration and landscaping.

B. Views and Quantities Required:
   1. Two views of each item.
   2. At least twenty views of overall project site monthly.
   3. Three prints of each view.

C. Camera used for digital photography shall be 12.0 megapixel resolution or greater.

D. Electronic Copies (USB):
   1. Maintain database of pictures for the entire length of the project.
   2. Each month, provide two USB drives with electronic versions of all prints taken in the past month.
   3. Provide two USB Drives with electronic versions of all prints taken during the course of the Project (in .jpg format) with final Application for Payment.
   4. All electronic copies of photos shall be in .jpg format. All electronic copies of photos shall be arranged on USB Drives by date and subject. Each .jpg photo file name shall include the subject description and date.

E. Photographic Prints:
   1. Quantity: For each photograph taken, provide to ENGINEER three prints.
   2. Print Size and Finish - submit 5-inch by 7-inch prints on professional-grade, nine-mil thick, photograph paper with semi-gloss or satin finish, unless otherwise specified.
   3. Include the following information on back of each print and front of each disc containing photographic documentation:
      a. Date photograph was taken.

b. Name of OWNER.
c. Name of the Site.
d. Project name.
e. Description of view shown in photograph.

1.3 REUSE OF CONSTRUCTION DOCUMENTATION

A. All construction documentation furnished to OWNER shall become the property of the OWNER and cannot be copyright or otherwise protected in a manner that prevents free reuse by the OWNER.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 DELIVERY OF PHOTOS

A. Preconstruction photos (prints and USB Drive format) shall accompany the first Application for Payment. This Application for Payment may not be approved without receipt of such materials.

B. Monthly construction photos prints and USB Drive format) shall accompany each monthly Application for Payment. Monthly Applications for Payment may not be approved without receipt of such materials.

C. Final construction photos (prints and USB Drive format) shall accompany the final Application for Payment. This Application for Payment may not be approved without receipt of such materials.

END OF SECTION

SECTION 01331

SHOP DRAWING PROCEDURES

PART 1 GENERAL

1.1 DESCRIPTION

A. Shop Drawing procedures shall conform to requirements of General Conditions and as described in this Section.

1.2 PROCEDURE

A. Submittals of Shop Drawings shall be made to the ENGINEER at the address listed in the Notice to Bidders.

B. A letter of transmittal shall accompany each submittal. If data for more than one Section of the Specifications is submitted, a separate transmittal letter shall accompany the data submitted for each Section.

C. Copies of submittals shall also be sent to the ERIE COUNTY WATER AUTHORITY at the Service Center address at 3030 Union Road, Buffalo, NY 14227 at the time CONTRACTOR submits to ENGINEER.

D. At the beginning of each letter of transmittal provide a reference heading indicating the following:

1. OWNER'S Name _____

2. Project Name _____

3. Contract No. _____

4. Transmittal No. _____

5. Section No. _____

E. If a Shop Drawing deviates from the requirements of the Contract Documents, CONTRACTOR shall specifically note each variation in his letter of transmittal.

F. All Shop Drawings submitted for approval shall have a title block with complete identifying information satisfactory to ENGINEER.

G. All Shop Drawings submitted shall bear the stamp of approval and signature of CONTRACTOR as evidence that they have been reviewed by CONTRACTOR. Submittals without this stamp of approval will not be reviewed by ENGINEER and will be returned to CONTRACTOR. CONTRACTOR'S stamp shall contain the following minimum information:

1. Project Name: _____

2. CONTRACTOR'S Name: _____

3. Date: _____

4. Submittal Item: _____

5. Submittal Number: _____

6. Specification Section: _____

7. Specifications Page No.: _____

8. Specifications Para. No.: _____

9. Reference Drawing No.: _____ of _____

10. Location: _____

11. Deviations: None_____; As Listed_____

12. Reference Specification Number_____

13. Space Requirement: As Designed_____ Different, As Listed_____

14. Representation is made to the OWNER and ENGINEER that the CONTRACTOR has determined and verified, or will determine and verify at the appropriate time, all field measurements and quantities, field construction criteria, materials, catalog numbers and similar data, that he has reviewed and coordinated the information in each shop drawing with the requirements of the work and the Contract Documents, and hereby approves this submittal.

    CONTRACTOR_____

    Signature_____

    Date_____

H. A number shall be assigned to each submittal by CONTRACTOR starting with No. 1 and thence numbered as described below. Resubmittals shall be identified by the original submittal number followed by the suffix "01" for the first submittal, the suffix "02" for the first resubmittal, etc.

1. Number the submittals as follows:
    a. First - Specification section number.
    b. Submittal number within the specification section.
    c. Review cycle number.
    d. Title of submittal.

    For example:

    15073-01-01 – Field lock gaskets for DIP (first review cycle)
    15073-01-02 – Field lock gaskets for DIP (second review cycle)
    15073-02-01 – Flange pipe and fittings (first review cycle)
    15073-02-02 – Flange pipe and fittings (second review cycle)
    15073-02-03 – Flange pipe and fittings (third review cycle)

I. CONTRACTOR shall provide electronic copies of all submittals in PDF format to the ENGINEER and OWNER.

J. After ENGINEER completes his review, Shop Drawings will be marked with one of the following notations:

1. Approved.
2. Approved as Corrected (No Resubmittal Required).

3. Approved as Corrected (Resubmittal Required).
4. Approved as Corrected (Provide Requested Information Only).
5. Revise and Resubmit.
6. Not Approved.
7. Not Reviewed.
8. Submitted for Information.

K. If a submittal is acceptable, it will be marked "Approved" or "Approved as Corrected." Four prints or copies of the submittal will be returned to the CONTRACTOR.

L. Upon return of a submittal marked "Approved" or "Approved as Corrected," CONTRACTOR may order, ship or fabricate the materials included on the submittal, provided it is in accordance with the corrections indicated.

M. If a Shop Drawing marked "Approved as Corrected" has extensive corrections or corrections affecting other drawings or Work, ENGINEER may require that CONTRACTOR make the corrections indicated thereon and resubmit the Shop Drawings for record purposes. Such drawings will have the notation, "Approved as Corrected (Resubmittal Required)."

N. If a submittal is unacceptable, copy will be returned to CONTRACTOR with one of the following notations:
1. "Revise and Resubmit."
2. "Not Approved."

O. Upon return of a submittal marked "Revise and Resubmit", CONTRACTOR shall make the corrections indicated and repeat the initial approval procedure. The "Not Approved" notation is used to indicate material or equipment that is not acceptable. Upon return of a submittal so marked, CONTRACTOR shall repeat the initial approval procedure utilizing acceptable material or equipment.

P. Any related Work performed or equipment installed without an "Approved" or "Approved as Corrected," Shop Drawing will be at the sole responsibility of the CONTRACTOR.

Q. Shop Drawings shall be submitted well in advance of the need for the material or equipment for construction and with ample allowance for the time required to make delivery of material or equipment after data covering such is approved. CONTRACTOR shall assume the risk for all materials or equipment, which are fabricated or delivered prior to the approval of Shop Drawings. Materials or equipment will not be included in periodic progress payments until approval thereof has been obtained in the specified manner.

R. ENGINEER will review and process all submittals promptly, but a reasonable time should be allowed for this, for the Shop Drawings being revised and resubmitted, and for time required to return the approved Shop Drawings to CONTRACTOR.

S. It is CONTRACTOR'S responsibility to review submittals made by his suppliers and Subcontractors before transmitting them to ENGINEER to assure proper coordination of the Work and to determine that each submittal is in accordance with his desires and that there is sufficient information about materials and equipment for ENGINEER to determine compliance with the Contract Documents. Incomplete or inadequate submittals will be returned for revision without review.

T. CONTRACTOR shall furnish required submittals with complete information and accuracy in order to achieve required approval of an item within three submittals. All costs to ENGINEER involved with subsequent submittals of Shop Drawings, Samples or other items requiring approval, will be backcharged to CONTRACTOR, at the rate of 3.0 times direct technical labor cost, by deducting such costs from payments due CONTRACTOR for Work completed. In the event that CONTRACTOR requests a substitution for a previously approved item, all of ENGINEER'S costs in the reviewing and approval of the substitution will be backcharged to CONTRACTOR unless the need for such substitution is beyond the control of CONTRACTOR.

U. Before submitting each Shop Drawing or Sample, CONTRACTOR shall have:

1. Reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.
2. Determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto.
3. Determined and verified the suitability of all materials offered with respect to the indicated application, chemical service, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work.
4. 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.
5. 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 both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to ENGINEER for review and approval of each such variation.

V. ENGINEER's Review - ENGINEER will provide review of Shop Drawings and Samples in accordance with the Schedule of Submittals approved by the 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. ENGINEER's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

W. ENGINEER's review and approval 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 1.03.I.5 above 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's review and approval shall not relieve CONTRACTOR from responsibility for complying with the requirements of paragraph 1.02.U.5 or Substitute procedures detailed in the General Conditions.

X. Resubmittal Procedures - CONTRACTOR shall make corrections required by ENGINEER and shall return the electronic copy 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.

Y. In the event that CONTRACTOR requests a change of a previously approved item, CONTRACTOR shall reimburse OWNER for ENGINEER's charges for its review time unless the need for such change is beyond the control of CONTRACTOR.

Z. Revise and resubmit submittals as required, identify all changes made since previous submittal.

AA. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

BB. Submittals not requested will not be recognized or processed.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01332

SAMPLES

PART 1 GENERAL

1.1 DESCRIPTION

A. The submittal of samples shall conform to the requirements of the General Conditions and to procedures described in the Section.

B. Samples and Shop Drawings, which are related to the same unit of Work or Specification Section, shall be submitted at the same time. If related Shop Drawings and samples are submitted at different times, they cannot be reviewed until both are furnished to the ENGINEER.

1.2 PROCEDURE

A. CONTRACTOR shall review, approve and submit all samples promptly. Samples shall be identified with correct reference to Specification Section, page, article and paragraph number, the Drawing No. when applicable. Samples shall clearly illustrate functional characteristics of the product and all related parts and attachments, and full range of color, texture, pattern and material. Samples shall be furnished so as not to delay fabrication, allowing the ENGINEER reasonable time for the consideration of the samples submitted.

B. CONTRACTOR shall submit at least two samples of each item required for the ENGINEER'S approval. Submission of samples shall conform to all applicable provisions under Shop Drawing Submittal and Correspondence procedure. One of the samples shall be delivered to the ENGINEER's main office unless otherwise authorized by the ENGINEER. One sample shall be delivered to the ENGINEER'S field office. If the CONTRACTOR requires a sample for his use, he shall notify the ENGINEER in writing.

C. The CONTRACTOR shall make all corrections required and shall resubmit the required number of new samples until acceptable to the ENGINEER.

1.3 SAMPLES FOR TESTS

A. CONTRACTOR shall furnish such samples of material as may be required for examination and test. All samples of materials for tests shall be taken according to standard methods and as required by the Contract Documents.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Quality assurance and control of installation.

B. References and standards.

C. Tolerances.

D. Field samples.

E. Mock-up.

F. Testing by CONTRACTOR.

G. Manufacturers' field services and reports.

1.2 RELATED SECTIONS

A. General Conditions.

B. Supplementary Conditions.

C. Section 01331 – SHOP DRAWING PROCEDURES.

1.3 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' instructions, including each step in sequence.

C. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

D. Should manufacturers' instructions conflict with Contract Documents, request clarification from ENGINEER before proceeding.

E. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

F. Perform work by persons qualified to produce workmanship of specified quality.

G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.4 REFERENCES AND STANDARDS

A. Conform to reference standard by date of issue current on date for receiving bids, or date specified in individual Sections, except where a specific date is established by code.

B. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

C. Should specified reference standards conflict with Contract Documents, request clarification from ENGINEER before proceeding.

1.5 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from ENGINEER before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.6 FIELD SAMPLES

A. Furnish field samples at the site as required by individual specification sections for review.

B. Acceptable samples represent a quality level for the Work.

C. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by ENGINEER.

1.7 MOCK-UP

A. Tests will be performed under provisions identified in this Section and as identified in the respective individual Sections.

B. Assemble and erect specified items, with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Where mock-up is specified in individual Sections to be removed, clear area after the work, which the mock-up depicts, has been accepted by ENGINEER. Do not remove mock-up until the associated work has been reviewed and accepted.

D. Accepted mock-ups shall be a comparison standard for quality required for the remaining Work.

1.8 TESTING BY CONTRACTOR

A. CONTRACTOR shall furnish required labor, facilities, tools, equipment, compressed air, water and electric power for tests, and:

1. Conduct hydrostatic and/or pressure tests on installed utilities, process piping, valves, air piping, tanks, and structures in accordance with individual Sections of the Specifications.

2. Pay all costs associated with such tests.

B. Each CONTRACTOR shall provide the materials, labor, and cost for testing and adjusting specific to their work as specified.

1.9 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, test, adjust, and balance of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to ENGINEER 30 days in advance of required observations. Observer subject to approval of ENGINEER and OWNER.

C. Report observations, site conditions, or instructions given to applicators or installers, that are supplemental or contrary to manufacturers' written instructions.

D. Submit report in duplicate within 15 days of observation to ENGINEER for review.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01411

SPILL PREVENTION CONTROL AND COUNTERMEASURES PLAN

PART 1 GENERAL

1.1 DESCRIPTION

A. CONTRACTOR shall comply with the Environmental Protection Agency's Spill Prevention Control and Countermeasures (SPCC) Plan requirements per 40 CFR Part 112, and applicable federal, state, and local regulations.

B. CONTRACTOR shall determine whether an SPCC Plan is required. If an SPCC Plan is required, the CONTRACTOR shall prepare, implement and maintain the SPCC Plan as required by the regulations.

C. CONTRACTOR shall retain a qualified Professional Engineer, licensed in the same State as the Site, to determine the need for an SPCC Plan. CONTRACTOR shall submit to ENGINEER a letter written by and stamped by the CONTRACTOR'S Professional Engineer stating whether an SPCC Plan is required for the Project.

D. An SPCC Plan is required if the Project activities meet the following criteria:
   1. Oil is stored, used, transferred, or otherwise handled at the Site.
   2. The maximum oil storage capacity at the site equals or exceeds either of the following thresholds: 42,000 gallons of buried capacity, or 1,320 gallons of aboveground capacity. Capacity includes the total storage tank volume and operational storage volume at the Site for prime contractors and Subcontractors, including bulk storage tanks, 55-gallon drums, tanks on construction equipment such as bulldozers and backhoes, mobile tankers located at the Site, and other vessels with 55-gallon capacity or larger. Oil includes petroleum products, fuel oil, hydraulic fluid, oil sludge, oil refuse, oil mixed with wastes other than dredged material, synthetic oil, vegetable oil, animal fats and oils, and other oils defined in the regulation.
   3. There is reasonable expectation, based on the location of the Site that an oil spill would reach navigable Waters of the United States or adjoining shorelines.

E. If an SPCC Plan is not required, CONTRACTOR shall ensure the conditions that preclude the need for an SPCC Plan, including the activities of all contractors and Subcontractors at the Site are maintained throughout the duration of the Project. Should changes that affect the storage, use, or handling of oil at the Site occur, CONTRACTOR'S Professional Engineer shall reassess the need for an SPCC Plan at no additional cost to the OWNER and provide to the ENGINEER a stamped letter with original signature regarding the need for an SPCC Plan.

F. If an SPCC Plan is required, CONTRACTOR shall develop the SPCC Plan and submit the plan for approval by the ENGINEER and OWNER. The SPCC Plan shall be specific to the Site and shall include the following:
   1. Stamp, original signature, and license number of CONTRACTOR'S Professional Engineer.
   2. A site plan identifying the name (or tag number) and location of each tank and container that will contain a substance regulated in 40 CFR 112, including aboveground and buried tanks. The site plan shall indicate the general directions of storm water runoff, including storm sewer pipes and inlets, and storm sewer outfall locations.
   3. For each tank and container on the site plan, provide a table that lists the tank or container's name (or tag number), type of oil stored, and the maximum storage capacity. List the total storage capacity of all tanks and containers at the Site.
   4. Predictions of direction, rate of flow, and total quantity of oil that could be discharged from the Site as a result of storage tank or container failure.

5. Plans for operating procedures that prevent oil spills, including procedures for oil handling, details of secondary containment structures at fuel and oil transfer areas, and details and descriptions of equipment to be used for oil handling, including piping.
6. Plans for control measures installed at the Site by the CONTRACTOR to prevent a spill from reaching navigable waters, including secondary containment and diversionary structures. For on-shore Sites, one of the following must be used, at minimum: dikes, berms, or retaining walls; curbing; culverts, gutters, or other drainage systems; weirs, booms, or other barriers; spill diversion ponds; retention ponds; sorbent materials. Where appropriate, the Plan shall clearly demonstrate that containment or diversionary structures or equipment are not practical.
7. Plans for countermeasures to contain, clean up, and mitigate the effects of an oil spill that reaches navigable waters, including a written commitment of manpower, equipment, and materials to quickly control and remove spilled oil. Include an estimation of the time required to contain the spill after the spill occurs.
8. Contact list and telephone numbers for the facility response coordinator, National Response Center, cleanup contractors, and all appropriate federal, state, and local agencies that must be contacted in the event of a discharge.
9. Program for monthly inspections of the Site by CONTRACTOR for SPCC Plan compliance. ENGINEER shall be notified of each inspection at least 72 hours in advance.
10. Plan for Site security relative to oil storage.
11. P lans for safely handling mobile containers (i.e. totes, drums, and fueling vehicles that remain at the Site).
12. Plans for periodic testing the integrity of tanks and containers, and associated piping and valves.
13. Plans for bulk storage container compliance.
14. Plans for personnel training and oil spill prevention briefings.
15. For SPCC Plans that do not follow the format listed in the applicable regulations, provide a cross reference to the requirements the applicable regulations, including 40 CFR Part 112.7.
16. Approval by the OWNER.
17. The SPCC Plan shall be reviewed by the CONTRACTOR'S Professional Engineer and the ENGINEER and OWNER every five years, as applicable.

G. CONTRACTOR shall post a copy of the approved SPCC Plan in a conspicuous location at the Site and provide copies to the OWNER, ENGINEER, and other prime contractors. CONTRACTORS shall comply with the SPCC Plan.

H. In the event of violation of the SPCC Plan or release of oils, the responsible CONTRACTOR shall pay fines or civil penalties (or responsible portion thereof) imposed on the OWNER by governing regulatory agencies and pay costs associated with cleanup of the spill. Spill cleanup shall conform to applicable regulations.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01413

CONTRACTOR'S HAZARDOUS MATERIALS MANAGEMENT PROGRAM

PART 1 - GENERAL

1.1 DESCRIPTION

A. CONTRACTOR shall comply with all federal, state, and local laws and Regulations related to environmental protection and environmental safety including, but not limited, to the following:
   1. Title 29 Code of Federal Regulations Parts 1910, Occupational Safety and Health.
   2. Title 40 Code of Federal Regulations, Environmental Protections.
   3. Title 49 Code of Federal Regulations, Transportation.
   4. State Occupational Safety and Health Administration (OSHA).

B. In order to ensure the OWNER that CONTRACTOR is complying with the intent of the regulations stated in paragraph 1.1.A, above, as they relate to the on-site use of hazardous materials, hazardous wastes and other substances similarly defined in those regulations, CONTRACTOR shall develop and maintain a CONTRACTOR'S Hazardous Materials Management Program that includes as a minimum, but is not limited to the requirements specified herein. The interests of the OWNER are that accidental spills, Site contamination, and injury of personnel on the Site are avoided. OWNER will not enforce suspected violations of the rules and regulations referenced in paragraph 1.1.A; however, the OWNER will notify CONTRACTOR of suspected violations. If in the opinion of the OWNER, CONTRACTOR fails to address the suspected violations in a timely and appropriate manner, OWNER will notify federal, state, or local regulatory agencies, report the suspected violations to them, and request that they inspect CONTRACTOR'S operations. Any fines that may be levied against OWNER for violations committed on the Site by CONTRACTOR as well as any costs to OWNER associated with cleanup of materials shall be reimbursed immediately by CONTRACTOR. All documents required by the program shall be made available to the OWNER'S environmental representative immediately, upon request.

C. Any hazardous waste, as defined in any of the above listed regulations, generated by CONTRACTOR shall be the responsibility of CONTRACTOR. If CONTRACTOR is going to generate, or has generated, a substance that qualifies as a hazardous waste, CONTRACTOR shall obtain a USEPA identification number, listing CONTRACTOR'S name and construction site address as the generator of the hazardous waste. CONTRACTOR shall be responsible for the identification, analysis, profiling, transport and disposal of hazardous wastes generated. The identification number can be obtained from the New York State Department of Environmental Conservation.

   This number shall be provided to the ENGINEER within five days after the Notice to Proceed, or before any hazardous materials are brought onto the Site.

1.2 HAZARDOUS MATERIALS PROGRAM REQUIREMENTS

A. Within the regulations listed in paragraph 1.1.A, terms such as hazardous material, hazardous wastes, and similar terms have varying definitions. To dispel confusion regarding what materials fall under the Program Requirements and for the purposes of this Article, Hazardous Material is defined as "any material, whether solid, semi-solid, liquid, or gas, which, if not stored or used properly, may cause harm or injury to persons through inhalation, ingestion, absorption or injection, or which may negatively impact the environment through the use or discharge of the material on the ground, in the water (including groundwater), or to the air."

B. All chemicals brought onto the Site must be approved by OWNER. Prior to bringing any chemical onto the Site, CONTRACTOR shall request approval from OWNER'S Environmental Representative for each chemical CONTRACTOR proposes to bring onto the Site. At the time of request, OWNER'S Environmental Representative may request and receive from CONTRACTOR, specific information associated with each chemical. The specific information may include, but is not limited to, Material Safety Data Sheets (MSDS), manufacture, vendor, container size(s), number of containers, minimum and maximum volume of material intended to be stored on-site, as well a description to the process or procedures in which any requested chemical is to be used. OWNER, within five days from receipt of the specific chemical information, will inform CONTRACTOR as to whether the chemical has been approved for use on-site.

C. CONTRACTOR shall, in accordance with applicable Laws and Regulations, develop a Hazardous Materials Communication Plan. At a minimum, CONTRACTOR shall maintain two notebooks on site containing: (1) a chemical inventory; and (2) current (dated within the past two years) for all materials being used on site, whether or not they are defined as a Hazardous Material in paragraph 1.2.A. One notebook shall be kept in CONTRACTOR'S on-site office and the other shall be kept in a location specified by the OWNER'S Environmental Representative. These notebooks must be kept up to date as materials are brought onto and removed from the Site. Copies of MSDS for chemicals removed from the Site shall be provided to the OWNER'S Environmental Representative.

D. CONTRACTOR shall develop an emergency/spill response plan, for each hazardous material or class/group of materials. As a minimum, the response plan must address the following:
   1. Provide a description of equipment on-site available to contain or respond to an emergency/spill of the material.
   2. Notification procedures.
   3. Response coordination procedures between CONTRACTOR, OWNER, and ENGINEER.
   4. Provide a Site Plan showing the location of stored hazardous materials and location of spill containment/response equipment.
   5. Provide a description of the hazardous material handling and spill response training provided to CONTRACTOR'S employees.

E. CONTRACTOR shall, in accordance with applicable Laws and Regulations, properly and safely store all hazardous materials, which shall include as a minimum, the following:
   1. Have a designated storage site for hazardous materials that includes secondary containment. The Site must include barriers to prevent vehicles from colliding with the storage containers and offer protection from environmental factors such as weather.
   2. Provide signage in accordance with applicable Laws and Regulations, clearly identifying the hazardous materials storage site.
   3. All hazardous materials containers must bear the applicable Hazard Diamonds.

F. CONTRACTOR shall properly label all containers of consumable materials, whether or not they are classified as Hazardous Materials under this Section. The name of CONTRACTOR or subcontractor shall be stenciled on any container containing a hazardous material and on any container over 5-gallon capacity containing a non- hazardous material. Any container must have a label clearly identifying the contents. If any such unlabeled containers are discovered on the Site, the OWNER'S environmental representative will notify CONTRACTOR, and CONTRACTOR will within one hour properly label the container or remove it from the Site. Any containers that are filled from larger containers must also be properly labeled.

G. OWNER encourages storage of hazardous materials off-site until the materials are needed on-site.

H. CONTRACTOR shall provide all documentation required herein available immediately upon request of OWNER'S Environmental Representative. CONTRACTOR'S Safety Representative will meet at least monthly with OWNER'S environmental representative to review CONTRACTOR'S Hazardous Materials Management Program documents, procedures, and inspect the storage site and the Site to ensure the requirements specified herein are being complied with. CONTRACTOR shall also provide OWNER'S environmental representative and the ENGINEER with copies of all permits obtained from environmental regulatory agencies.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01415

CONFINED SPACE ENTRY PLAN

PART 1 GENERAL

1.1 DESCRIPTION

A. Scope:
   1. OWNER has determined that portions of the Site may constitute confined spaces or permit-required confined spaces, as defined in this Section.
   2. CONTRACTOR shall provide appropriate measures, including labor, supervision, equipment, protective devices, and incidentals, to protect the health and safety of personnel at the Site relative to confined spaces, and who may be affected by the Work in confined spaces including, without limitation: employees and agents of CONTRACTOR, Subcontractors, Suppliers, OWNER, ENGINEER, and ENGINEER's consultants, while engaged in performance of their respective duties at Site.
   3. Comply with requirements of OWNER's confined space entry program, if any.

1.2 TERMINOLOGY

A. The following words or terms are not defined but, when used in this Section, have the following meaning:
   1. "Confined spaces" are areas on or about the Site as defined in 29 CFR 1910.146(b) and 29 CFR 1926.21(b)(6). Confined spaces include, but are not limited to: storage tanks, process vessels, bins, boilers and similar spaces; ventilation or exhaust ducts and stacks; manholes, underground utility vaults and chambers, sewers, pipelines, tunnels; and open-topped spaces greater than four feet deep, such as pits, tubs, vaults, and vessels.
   2. "Entry permit" means the written or printed document provided by the employer of personnel entering permit-required confined space, to allow and control entry into permit-required confined space and that contains the information specified in 29 CFR 1926.146(f).
   3. "Permit-required confined space" means confined space as defined in 29 CFR 1926.146(b) and that has one or more of the following characteristics:
      a. Contains or has potential to contain a hazardous atmosphere.
      b. Contains material that has potential for engulfing an entrant.
      c. Has internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or floors, or by floor that slopes downward and tapers to a smaller cross-section.
      d. Contains other recognized serious safety or health hazard.
   4. "Hot work permit" means the written authorization of employer of personnel entering a confined space to perform operations, such as riveting, welding, cutting, burning, and heating, capable of providing a source of ignition.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with Laws and Regulations related to protecting personnel working in or entering confined spaces, including:
   1. Code of Federal Regulations (CFR), Title 29, Part 1910, Occupational Safety and Health Standards.
   2. CFR, Title 29, Part 1926, Safety and Health Regulations for Construction.

1.4 SUBMITTALS

A. Informational Submittals: If acceptable, written response for Informational Submittals required in this Section will not be returned to CONTRACTOR. Submit the following to OWNER; if submittals under this Section are furnished to ENGINEER, ENGINEER will forward all submittals under this Section to OWNER without review.
   1. Procedures: Site-specific confined space entry plan, submitted upon request of OWNER.
   2. Permits and Reports: For each time personnel enter a confined space, copies of completed permits required for confined space entry, and completed confined space data sheets, submitted upon request of OWNER.

1.5CONFINED SPACE ENTRY PLAN

A. Prepare Site-specific confined space entry plan, which shall be incorporated into CONTRACTOR's Site-specific health and safety plan. Maintain copy of the confined space entry plan at the Site for access by employees, OWNER and authorities having jurisdiction. Confined space entry plan shall include:
   1. Results of CONTRACTOR's Site-specific hazard assessment to identify confined spaces that are permit-required confined spaces, including list of all such spaces that will be accessed for the Work. Update the list as required throughout the Project.
   2. Requirements for safeguarding access to, and restricting non-permitted personnel from access to, permit-required confined spaces during the Work.
   3. Project-specific procedures to be followed when entering or accessing permit-required confined spaces.
   4. Documentation of training provided to each person that will enter, or work in conjunction with entry to, permit-required confined spaces
   5. Update the plan by adding copies of permits issued and records of entry to permit-required confined spaces, as required in Article 1.6 of this Section.

1.6 CONFINED SPACE SAFETY

A. Personnel entering confined space shall be trained in accordance with 29 CFR 1926.21 (b)(6) and 29 CFR 1910.146(g).

B. Comply with 29 CFR 1910.146 and requirements of authorities having jurisdiction.

C. Recordkeeping: Using the example forms attached to this Section, or other forms required by CONTRACTOR, OWNER, or authority having jurisdiction, issue for each instance of access to permit-required confined space, completed permit(s) and complete associated data sheet. File completed permits and data sheets in the Site-specific confined space entry plan, and submit in accordance with Article 1.4 of this Section.
   1. Permit for entry to permit-required confined space(s).
   2. Permit for hot work in permit-required confined space(s).
   3. Complete confined space data sheet.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 SUPPLEMENTS

A. The example forms listed below, following the “End of Section” designation, are part of this Specification Section:
   1. “Confined Space Data Sheet” (one page).
   2. “Confined Space Entry Permit (two pages).
   3. “Confined Space Hot Work Permit” (one page).

END OF SECTION

CONFINED SPACE DATA SHEET

Name of Confined Space: _____

Location of Confined Space: _____

Contractor/Subcontractor Accessing Confined Space: _____

_____

PRE-ENTRY SYSTEM CONTROL

		Check
Mechanical:	Isolate, lockout and de-energize to zero potential energy.	☐
Engulfment:	Blank/block/cap/bleed off lines. Lock out gates, valves, pumps.	☐
Electrical:	Lockout/Tag-out	☐
Inerting:	Flush/Purge/Vent	☐

Special Precautions: _____

_____

ATMOSPHERE

Date of Last-measured Values: _____

	Oxygen	Explosive	H_2S/Toxic	CO	Date/Time Completed	Initials
Permissible Range	19.5%-23.5%	< 10% LFL	< 10 ppm H_2S	< 35 ppm	--	--
Last Measured						
Values This Entry						

SITE AND PERSONAL SAFETY (check if required, list type where applicable)

Personal Protective Equipment:
Safety Harness ☐. Life Lines ☐. Hard Hats ☐. Fall Protection ☐. Retrieval ☐. Eye ☐. Ear ☐. Face ☐. Hand ☐.
Foot ☐. Respiratory ☐ (type) _____. Clothing ☐ (type) _____
Other: ☐ _____

Rescue and Emergency Equipment:
Retrieval Equipment ☐. Fire Extinguishers ☐. Radios/Telephone ☐. Ladder☐. Other ☐ _____
Equipment on Standby for Rescue Personnel ☐ _____

_____

Site Safety:
Explosion-Proof Lighting ☐. Barriers/Shield/Barricades ☐ (type) _____. Postings/Flagging ☐.
Other ☐ _____

_____

List specific equipment isolated, de-energized, and locked out.

_____

CONFINED SPACE ENTRY PERMIT

ENTRY TEAM

Contractor/Subcontractor Accessing Confined Space: _____

Facility: _____

Specific Confined Space Being Entered: _____

Purpose of Entry (describe the work to be done): _____

_____

Date: _____ **Time:** _____ **Expected Job Duration (days/hours):** _____

Entry Supervisor: _____ **Designated Attendant:** _____

Authorized/Qualified Entrants: _____ _____

_____ _____

_____ _____

Entry Team Rotation:

Date: _____ **Time:** _____

Entry Supervisor: _____ **Designated Attendant:** _____

Authorized/Qualified Entrants: _____ _____

_____ _____

_____ _____

Entry Team Rotation:

Date: _____ **Time:** _____

Entry Supervisor: _____ **Designated Attendant:** _____

Authorized/Qualified Entrants: _____ _____

_____ _____

_____ _____

Communication Procedures:

Entry Team: _____

_____

_____

Standby/Rescue Personnel: _____

_____

_____

Sign Offs:

Person Authorizing This Entry: _____

Entry Supervisor: _____

Person Terminating Permit: _____ **Date:** _____ **Time:**

Distribution to: _____ _____ _____

Attach to this permit a list of rescue and emergency services that can be summoned and the means (such as the equipment to use and the numbers to call) for summoning those services.

Confined Space Entry Permit (PAGE 2 of 2)

PRE-ENTRY SYSTEM CONTROL

Check Date/Initials

Mechanical: Isolate, lockout and de-energize to zero potential energy.
Completed ☐ _____

Engulfment: Blank/block/cap/bleed off lines. Lock out gates, valves, pumps. Completed ☐ ___

Electrical: Lockout/Tag-out
Completed ☐ _____

Inerting: Flush/Purge/Vent
Completed ☐ _____

Special Precautions: _____

ATMOSPHERE - Tested by portable atmospheric monitor with audible and visual alarms.
No one will enter a space with an unsafe atmosphere without approval from the Division Superintendent/Assistant Superintendent.

	Oxygen	Explosive	H_2S/Toxic	CO	Date/Time Completed	Initials
Permissible Range	19.5%-23.5%	< 10% LFL	< 10 ppm H_2S	< 35 ppm	--	--
Pre-Entry						
Post Ventilation						
Continuous						
Continuous						
Continuous						

Ventilation Used (circle one): Mechanical Natural
Special Precautions: (See Confined Space Data Sheet) _____

SITE AND PERSONAL SAFETY (check if required, list type where applicable)

Personal Protective Equipment:
Safety Harness ☐. Life Lines ☐. Hard Hats ☐. Fall Protection ☐. Retrieval ☐. Eye ☐. Ear ☐. Face ☐. Hand ☐.
Foot ☐. Respiratory ☐ (type) _____. Clothing ☐ (type) _____
Other: ☐ _____

Rescue and Emergency Equipment:
Retrieval Equipment ☐. Fire Extinguishers ☐. Radios/Telephone ☐. Other ☐ _____
Equipment on Standby for Rescue Personnel ☐ _____
_____
_____

Site Safety:
Explosion-Proof Lighting ☐. Barriers/Shield/Barricades ☐ (type) _____.
Postings/Flagging ☐.
Other ☐ _____

List specific equipment isolated, de-energized, and locked out.

_____

_____

CONFINED SPACE HOT WORK PERMIT

Contractor/Subcontractor Accessing Confined Space for Hot Work: _____

_____

Facility: _____

Specific Confined Space Being Entered: _____

_____

Date: _____ **Time:** _____

Expected Job Duration (days/hours): _____

Purpose of Entry (describe the work to be done): _____

_____

_____

_____

Explain Why Work Cannot be Done Outside of the Confined Space: _____

_____

_____

_____

Safety Equipment Required:

Fire Extinguishers: **Yes** ____ **No** _____ **Number**

Type _____

Respirators: **Yes** _____ **No** _____ **Number**

Type _____

Other Equipment: _____

Authorizing Supervisor:

Print Name _____

Signature _____

Date Signed _____

SECTION 01420

SPECIAL INSPECTIONS

PART 1 GENERAL

1.1 DESCRIPTION

A. Special inspections and structural testing shall be in accordance with Chapter 17 of the latest edition of the Building Code of New York State.

B. The program of special inspection and testing is a quality assurance program intended to ensure that the work is performed in accordance with the Contract Documents.

C. This specification section is intended to inform the CONTRACTOR of the OWNER's quality assurance program and the extent of the CONTRACTOR's responsibilities.

1.2 RELATED SECTIONS

A. Section 01450 – TESTING LABORATORY SERVICES FURNISHED BY CONTRACTOR

B. Section 02228 – COMPACTION

C. Section 03300 – CAST IN PLACE CONCRETE

D. Section 04300 – UNIT MASONRY SYSTEMS

E. Section 05210 – STEEL JOISTS

1.3 SCHEDULE OF INSPECTIONS AND TESTS

A. Required inspections and tests include, but are not limited to, those listed in the individual specification sections for the items to be inspected or tested. Special inspections include, but are not limited to:

1. Concrete testing.
2. Soil testing.
3. Steel Joist testing.
4. Tests made for the CONTRACTOR's convenience.
5. Repeat tests required because of the CONTRACTOR's negligence or repeated failure to meet Specification requirements.

1.4 QUALIFICATIONS

A. The Special Inspector, testing laboratory, and individual technicians shall be approved by the ENGINEER and OWNER.

B. The testing laboratory shall maintain a full time licensed professional engineer on staff who shall certify all test reports initiated by the testing laboratory. This ENGINEER shall be in responsible charge of the field and laboratory testing operations.

1.5 SUBMITTALS

A. The Special Inspectors and testing laboratory shall disclose any past or present business relationship or potential conflict of interest with the CONTRACTOR or any of the subcontractors whose work will be inspected or tested.

1.6 PAYMENT

A. The OWNER shall engage and pay for the services of the Special Inspector, agents of the Special Inspector, and testing laboratory.

B. The CONTRACTOR shall be responsible for the cost of any tests made for the CONTRACTOR's convenience and retesting or re-inspection of work, which fails to comply with the requirements of the Contract Documents.

1.7 CONTRACTOR RESPONSIBILITIES

A. The CONTRACTOR shall cooperate with the Special Inspector, his agents, and the testing laboratory so that the special inspections and testing may be performed without hindrance.

B. The CONTRACTOR shall review the "Statement of Special Inspections" and shall be responsible for coordinating and scheduling inspections and tests. The CONTRACTOR shall notify the Special Inspector or testing laboratory at least 48 hours in advance of a required inspection or test.

C. Uninspected work that required inspection may be rejected solely on that basis.

D. The CONTRACTOR shall provide incidental labor and facilities (ladders, scaffolding, lights, safety equipment, etc.) to provide access to the work to be inspected or tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.

E. The CONTRACTOR shall keep at the project site the latest set of construction drawings, field sketches, approved shop drawings, and specifications for use by the inspectors and testing technicians.

F. The special inspection program shall in no way relieve the CONTRACTOR of his obligation to perform work in accordance with the requirements of the Contract Documents or from implementing his own quality control program.

G. All work that is to be subjected to special inspections shall first be reviewed by the CONTRACTOR's quality control personnel.

H. The CONTRACTOR shall be solely responsible for construction site safety.

1.8 LIMITS OF AUTHORITY

A. The Special Inspector or testing laboratory may not release, revoke, alter, or enlarge on the requirements of the Contract Documents.

B. The Special Inspector or testing laboratory will not have control over the CONTRACTOR's means and methods of construction.

C. The Special Inspector or testing laboratory shall not be responsible for construction site safety.

D. The Special Inspector or testing laboratory has no authority to stop the work.

1.9 RECORDS AND REPORTS

A. Daily reports shall be prepared of each inspection or test and be submitted daily to the Special Inspector. Reports shall include:

1. Date of test or inspection.
2. Name of inspector or technician.
3. Location of specific areas tested or inspected.
4. Description of test or inspection and results.
5. Applicable ASTM standard.
6. Signature of inspector or technician.

B. Any discrepancies from the Contract Documents shall be reported to the CONTRACTOR. Reports shall document all discrepancies identified and the corrective action taken. If the discrepancies are not corrected immediately, the Special Inspector shall notify the ENGINEER of Record and Building Official and post a list of discrepancies at the project site.

C. At the completion of the work requiring Special Inspections, each inspection agency and testing laboratory shall provide a statement to the Special Inspector that all work was completed in substantial conformance with the Contract Documents and that all appropriate inspections and tests were performed. This statement must itemize any discrepancies that were not corrected or resolved.

1.10 FINAL REPORT OF SPECIAL INSPECTIONS

A. The “Final Report of Special Inspections” shall be completed by the Special Inspector and submitted to the ENGINEER of Record and Building Official prior to the issuance of a Certificate of Use and Occupancy.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01421

REFERENCE STANDARDS

PART 1 GENERAL

1.1 DESCRIPTION

A. When a reference standard is specified, comply with requirements and recommendations stated in that standard, except when they are modified by the Contract Documents, or when applicable laws, ordinances, rules, regulations or codes establish stricter standards. The latest provisions of applicable standards shall apply to the Work, unless otherwise specified. Reference standards include, but are not necessarily limited to, the following:

1. American Association of State Highway and Transportation Officials.
2. American Concrete Institute.
3. American Gear Manufacturers Association.
4. American Institute of Steel Construction.
5. American Iron and Steel Institute.
6. American National Standards Institute.
7. American Society of Heating, Refrigerating and Air Conditioning Engineers.
8. American Society of Mechanical Engineers.
9. American Society for Testing and Materials.
10. American Water Works Association.
11. American Welding Society.
12. Concrete Reinforcing Steel Institute.
13. Factory Mutual Research Corporation.
14. Institute of Electrical and Electronics Engineers.
15. National Electrical Manufacturer's Association.
16. Occupational Safety and Health Administration.
17. National Fire Protection Association.
18. Prestressed Concrete Institute.
19. Underwriters' Laboratories, Inc.
20. NSF International.
21. International Organization for Standardization (ISO).
22. SSPC: The Society for Protective Coatings.
23. American Petroleum Institute.
24. NACE International.
25. All other applicable standards listed in the Specifications, and the standards of utility service companies, where applicable.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01422

ABBREVIATIONS AND SYMBOLS

PART 1 GENERAL

1.1 ABBREVIATIONS

A. Common abbreviations which may be found in the Specifications are:

alternating current....a-c
ante meridiem....am
ampere....A
average....avg

biochemical oxygen demand....BOD
brake horsepower....bhp
British thermal unit....Btu

Centigrade....°C
Company....Co
cubic inch....cu in
cubic foot....cu ft
cubic yard....cu yd
cubic feet per minute....cfm
cubic feet per second....cfs

decibel....db
degree Centigrade (or Celsius) (say)....20°C
degree Fahrenheit (say)....68°F
diameter....diam
direct current....d-c
dollars....$

each....ea
efficiency....eff

Fahrenheit....EF
feet....ft
feet per hour....fph
feet per minute....fpm
feet per second....fps
Figure....Fig
flange....flg
foot-pound....ft-lb
gallon....gal
gallons per minute....gpm
gallons per second....gps
gram....g

Hertz....Hz
hour....hr
horsepower....hp

inch....in.
inch-pound....in.-lb
inside diameter....id

kilovolt-ampere....kva
kilowatt....kw
kilowatt-hour....hwhr

linear foot....lin ft
liter....l

maximum....max
mercury....Hg
milligram....mg
milligrams per liter....mg/l
milliliter....ml
millimeter....mm
million gallon....mil
million gallons per day....mgd
minimum....min

net positive suction head....npsh
number....No.
National Pipe Threads....NPT

ounce....oz
outside diameter....od

parts per million....ppm
post meridiem....pm
pound....lb
pounds per square foot....psf
pounds per square inch absolute....psia
pounds per square inch gage....psig

revolutions per minute....rpm

second....sec
specific gravity....sp gr
square....sq
square foot....sq ft
square inch....sq in
square yard....sq yd

standard.....std
standard cubic feet per minute .....scfm

total dynamic head.....tdh

totally-enclosed- fan-cooled .....tefc

volt.....v

1.2 ORGANIZATION ABBREVIATIONS

A. Abbreviations of organizations which may be used in these Specifications are:

ACS	American Chemical Society
ACI	American Concrete Institute
AGMA	American Gear Manufacturers Association
AIChE	American Institute of Chemical Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APHA	American Public Health Association
API	American Petroleum Institute
AREA	American Railway Engineering Association
ASTM	American Society for Testing and Materials
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
AWWA	American Water Works Association
AWS	American Welding Society
CRSI	Concrete Reinforcing Steel Institute
ECWA	Erie County Water Authority
EPA	Environmental Protection Agency
FM	Factory Mutual Research Corporation
HEW	Department of Health, Education and Welfare
HUD	Department of Housing and Urban Development
IEEE	Institute of Electrical and Electronic Engineers
IRI	Industrial Risk Insurance
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International
NARUC	National Association of Railroad and Utilities Commissioners
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Administration
PCI	Precast Concrete Institute
SMACNA	Sheet Metal and Air Conditioning National Association
SSPC	Steel Structures Painting Council
UL	Underwriters' Laboratories, Inc.
USGS	United States Geological Survey
USPHS	United States Public Health Service
WWEMA	Water and Wastewater Equipment Manufacturers Association

1.3 MISCELLANEOUS ABBREVIATIONS

ACP ..... Asbestos cement pipe
DIP ..... Ductile iron pipe
mj ..... Mechanical joint
PCCP ..... Prestressed concrete cylinder pipe
pe ..... Plain end
PVC ..... Polyvinyl chloride
s ..... spigot
w/ ..... with

1.4 SYMBOLS

A. Refer to Drawings for symbols used on the Contract Drawings.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED END OF SECTION

END OF SECTION

SECTION 01450

TESTING LABORATORY SERVICES FURNISHED BY CONTRACTOR

PART 1 GENERAL

1.1 DESCRIPTION

A. CONTRACTOR shall employ and pay for an independent testing laboratory to perform the specified services. Laboratory selected shall be subject to approval by the ENGINEER and OWNER.

B. Inspection, sampling and testing shall be as specified in the Technical Sections.

1.2 RELATED SECTIONS

A. Section 01420 – SPECIAL INSPECTIONS

B. Section 03000 – CONCRETE

C. Section 04300 – UNIT MASONRY SYSTEM

1.3 QUALIFICATIONS OF LABORATORY

A. Where applicable, meet "Recommended Requirements for Independent Laboratory Qualification", latest edition, published by American Council of Independent Laboratories and the basic requirements of ASTM E329, Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

B. The laboratory shall be certified by New York State for testing potable water. A NYS ELAP number shall be referenced on all test results.

C. Submit copies of ELAP certificates for all potable water testing.

D. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during most recent tour of inspection; with memorandum of remedies of any deficiencies reported by inspection.

E. Testing Equipment:

1. Calibrated at maximum 12-month intervals by devices of accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.
2. Submit copy of certificate of calibration, made by accredited calibration agency.

1.4 LABORATORY DUTIES

A. Cooperate with ENGINEER and provide qualified personnel promptly on notice.

B. Perform specified inspections, sampling and testing of materials and methods of construction; comply with applicable standards; ascertain compliance with requirements of Contract Documents.

C. Promptly notify ENGINEER and CONTRACTOR of irregularities or deficiencies of Work, which are observed during performance of services.

D. Promptly submit five copies of reports of inspections and tests to ENGINEER including:

1. Date issued.
2. Project title and number.
3. Testing laboratory name and address.
4. Name and signature of inspector.
5. Date of inspection or sampling.
6. Record of temperature and weather.
7. Date of test.
8. Identification of product and Specification Section.
9. Location in Project.
10. Type of inspection or test.
11. Results of tests and observations regarding compliance with Contract Documents.

E. Perform additional tests and services as required to assure compliance with the Contract Documents.

1.5 CONTRACTOR'S COORDINATION WITH LABORATORY

A. Cooperate with laboratory personnel, provide access to Work and to manufacturer's operations.

B. Provide to laboratory representative samples of materials to be tested, in required quantities.

C. Furnish labor and facilities:

1. To provide access to Work to be tested.
2. To obtain and handle samples at the site.
3. To facilitate inspections and tests.
4. For laboratory's exclusive use for storage and curing of test samples.
5. Forms for preparing concrete test beams and cylinders.

D. Notify laboratory and ENGINEER sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests.

E. Arrange with laboratory and pay for, additional samples and tests required for CONTRACTOR'S convenience.

1.6 PRODUCT TEST REPORTS

A. Furnish copies of product test reports where required by the Specifications or requested by ENGINEER.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01520

TEMPORARY CONSTRUCTION FACILITIES

PART 1 GENERAL

1.1 DESCRIPTION

A. CONTRACTOR shall be responsible for all temporary construction facilities required for the Work. CONTRACTOR shall make all arrangements with utility service companies for temporary services and shall pay all costs associated therewith.

B. Temporary construction facilities include:
1. Water.
2. Electricity and lighting.
3. Telephone.
4. Internet Access.
5. Heat, weather protection, and ventilation.
6. Fire protection.
7. Sanitary and first aid facilities.

C. CONTRACTOR shall abide by all rules and regulations of the utility service company, OWNER or authority having jurisdiction. CONTRACTOR shall coordinate and schedule all utilization and tie-in work of existing electric, lighting and water service and shall provide OWNER and ENGINEER written notice at least 48 hours before utilizing existing electric, lighting and water service. CONTRACTOR shall carry out all operations to avoid interference with operations of the existing facilities.

D. Sufficient temporary heat and ventilation shall be provided to assure safe working conditions and that no damage will occur to any of the Work.

E. Provide all materials, equipment and power required for temporary electricity and lighting. Include continuous power for construction site offices. Provide all outlets with circuit breaker protection and comply with ground fault protection requirements of NEC. Provide minimum of one 300-watt lamp each 20 feet in work areas.

F. Suitably enclosed chemical or self-contained toilets shall be provided for the use of the persons employed on the Work. Toilets shall be located near the Work site and secluded from observation insofar as possible. Toilets shall be serviced at regular intervals, kept clean and supplied throughout the course of the Work. No use of OWNER Facilities allowed.

G. CONTRACTOR shall furnish and maintain a safe drinking water supply readily available to all workers.

H. CONTRACTOR shall be responsible for all utility service costs if constructing a building or facility until the Work is substantially complete. Included are all fuel, power, light, heat and other utility services necessary for execution, completion, testing, and initial operation of the Work.

I. CONTRACTOR shall:
1. Comply with applicable requirements specified in the Technical Specifications.
2. Maintain and operate systems to assure continuous service.
3. Modify and extend systems as Work progress requires.
4. Completely remove temporary materials and equipment when their use is no longer required.
5. Clean and repair damage caused by temporary installations or use of temporary facilities.

6. Restore existing facilities used for temporary services to specified or to original condition.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01521

CONTRACTOR'S FIELD OFFICE

PART 1 GENERAL

1.1 DESCRIPTION

A. Provide CONTRACTOR'S field office at location shown on Contract Drawings or specified by the ENGINEER or OWNER with the minimum facilities specified. Provide all required storage and work sheds.

B. Field Office and Furnishings:
1. As required by CONTRACTOR but with sufficient room for project meetings.
2. Include conference table and chairs sufficient for six persons.
3. Telephone service with answering machine/voicemail.
4. Fax machine.
5. Light and temperature control.
6. Six protective helmets for visitor's use.
7. Exterior identifying sign.
8. Desk, four-drawer file cabinet, and separate telephone for Resident Project Representative's use.
9. First aid kit.
10. Other furnishings at CONTRACTOR'S option.

C. Provide electric service as required from local utility and pay all charges.

D. Provide one set of all Contract Documents in the office for ready reference at all times by interested parties.

E. Post the emergency phone list, necessary OSHA documents, New York State Labor Law requirements, and all permits on wall for easy inspection to all visitors.

F. CONTRACTOR must maintain project file in field office containing copies of all approved submittals (with ENGINEER'S approval stamp), manufacturer's data for all materials used on site, and a health and safety manual as per OSHA requirements.

G. Remove office and sheds upon final acceptance unless otherwise approved by ENGINEER.

H. Restore area to pre-construction condition to satisfaction of ENGINEER.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION NOT USED

END OF SECTION

SECTION 01522

ENGINEER'S FIELD OFFICE

1.1 GENERAL

A. CONTRACTOR shall provide and maintain a field office for the ENGINEER of the project site. Provide an office at a location approved by the ENGINEER and OWNER. The field office shall be complete and fully functional at the same time that the CONTRACTOR's field office is functional at the site.

B. Allocate three reserved parking spaces for use by the ENGINEER and OWNER in close proximity to the ENGINEER's field office. Parking area shall be paved with asphalt concrete, crushed stone, or bank run shell, and shall include a walkway of asphalt concrete, crushed stone, or material acceptable to the ENGINEER, between the parking area and the field office.

1.2 SUBMITTALS

A. Provide submittals for the following, prior to staging the field office at the Site:
   1. Proposed Internet service provider and type of service.
   2. Digital Camera: Technical data and information on the camera and accessories.

1.3 MINIMUM CONSTRUCTION

A. Requirements:
   1. Structurally sound foundation and superstructure.
   2. Completely weather tight and insulated.
   3. Exterior finish acceptable to ENGINEER.
   4. New interior finishes acceptable to ENGINEER.
   5. Resilient floor covering in first class condition.
   6. Size: 250 square feet floor area.
   7. Windows: 10 percent of floor area with operable sash and screens. Windows shall be furnished with locks and exterior security bars approved by the ENGINEER.
   8. One lockable closet for storage.
   9. Two means of ingress and egress, each with landing, stairs, and hand railing confirming to local building codes.

1.4 OPTIONAL CONSTRUCTION

A. Mobile office trailer in first-class condition acceptable to ENGINEER, specifically designed for use as a construction field office and conforming to the requirements of this Specification section.

1.5 MINIMUM SERVICES

A. Provide the following:
   1. Electrical System:
      a. Provide electric service as required from local utility and pay all charges.
      b. Interior lighting of 50 foot-candles at desktop height.
      c. Exterior light at entrance.
      d. Eight 120-volt, wall-mounted, convenience electrical receptacles.

2. Heating, Ventilating, and Air Conditioning System:
    a. Automatic heating to maintain 65 degrees F in the cold weather. Furnish and pay for all fuel and utility costs.
    b. Automatic cooling to maintain 75 degrees F in warm weather.
3. Telephone Service:
    a. Cellular telephone service for ENGINEER's sole use, including payment of any set up charges.
    b. One direct-line cellular telephone service with voicemail service.
    c. Pay local and long distance, text messaging, and data charges up to a maximum of $150 per month for the duration of the Project.
4. Internet Access: CONTRACTOR shall obtain and pay for high-speed internet service (minimum 10 Mbps) until removal of the field office, with unlimited (untimed) Internet access. Set up system and appurtenances required and verify functionality in the field office. Internet service shall be one of the following, listed in order of preference; provide a lower type of access only when higher levels are unavailable:
    a. Mobile Broadband Wireless 4G Network: Provide the following for ENGINEER's sole use:
        1) Mobile broadband wireless 4G network service by Verizon or equal, with minimum speed of 10 Mbps.
        2) Mobile broadband wireless router. Product and Manufacturer: Linksys Wireless-G Router for Mobile Broadband, or equal.
        3) Router and air-card will remain CONTRACTOR's property upon removal of field office from the Site.
    b. DSL: Minimum 10 Mbps symmetrical digital subscriber line.
5. Water and Sewerage:
    a. Provide in the field office one private restroom including one lavatory, one toilet, medicine cabinet with mirror, soap dispenser, paper towel holder, and electric hot water tank or instantaneous hot water heater.
    b. Utility Connections, General: Conform to local plumbing and sewer codes. Protect plumbing from freezing.
    c. Water: Provide potable water service to the field office, including Type K copper waterline connecting to a potable water main. Provide a RPZ-type backflow preventer as required by local authorities having jurisdiction.
    d. Sewerage: Provide piping to convey wastewater from the field office to a sanitary sewer discharging to a wastewater treatment facility, or to a holding tank provided by the CONTRACTOR. Provide pumping and disposal of holding tank contents at regular intervals.

B. Should actions of utility companies delay the complete set up of the field office, CONTRACTOR shall provide temporary electricity, heat, water supply, and sanitary facilities as required at no additional cost to the OWNER.

1.6 MINIMUM FURNISHINGS AND EQUIPMENT

A. Provide the following furnishings and equipment at each field office:
1. Desks: Two 5-drawer desks, each 60 inches by 30 inches with at least one 8.5-inch by 11-inch file drawer each.
2. Desk Chairs: Two new or used (in good condition) five-point, high backed, swivel chairs.
3. Other Chairs: Four side chairs with armrests, and eight folding chairs without armrests.
4. Two new or used (in good condition) folding tables each 6.0 feet long.
5. One plan rack to hold a minimum of eight sets of the Drawings.
6. Two 4-drawer file cabinets.
7. One 2-door storage cabinet.
8. Shelving or bookcase with a total of 12 feet of shelf length at least 12 inches deep.
9. Two waste baskets.
10. Suitable mat or carpet at each doorway.
11. One tack board 30 inches by 36 inches, with thumbtacks.

12. One white board for use with dry markers, approximately 6.0 feet by 4.0 feet, with marker holding tray, installed by CONTRACTOR at a location directed by ENGINEER in the field. Provide a supply of colored markers and eraser for the white board.
13. Fire extinguishers and associates signage, and smoke detector, per local codes. At minimum provide two wall-mounted fire extinguishers and one battery operated ceiling-mounted smoke detector.
14. Identifying exterior sign acceptable to the ENGINEER, at least 24 inches by 36 inches in size. Text shall be 4 inches high, Arial font, unless otherwise approved by the ENGINEER.
15. First aid kit, by Zee Medical Service Co., Item 0125, **"**Kit, Utility, Metal, Full (ANSI),**"** (800) 225-5933), www.zeemedical.com, or equal.
16. Outdoor thermometer mounted in the shade and located for convenient reading from inside the field office.
17. Three protective helmets for use by ENGINEER, OWNER, and visitors.
18. Bottled water with electric cooler dispenser for 5-gallon bottles, with cup dispenser.
19. One electric clock.
20. One electric coffee maker, with 10-cup capacity or larger.
21. One combination printer/fax/copier/scanner such as Model WP-4540 as supplied by Epson, or equal and a wireless router appropriate to the internet access provided, with 10-bin sort capacity, 8.5-inch by 11-inch, 8.5-inch by 14-inch, and 11-inch by 17-inch paper capacity, enlarging and reducing capabilities, stream-feed capability, bypass feeder, stapling capability, and double-sided copying capability. Copier shall provide a minimum of 40 copies per minute.
22. Digital Camera:
    a. Provide one compact digital still camera with built-in flash for use by the ENGINEER for the duration for the Project.
    b. Camera shall have, at minimum, 7.5x combined zoom and 12 mega pixel, resolution, minimum. Camera shall be equipped with a 1.5-inch low temperature polycrystalline silicon TFT color LCD.
    c. Provide a 1 GB or larger memory card for the camera.
    d. Provide compatible USB type interface cable and software necessary to download photographs from the camera to ENGINEER'S computer.
    e. Camera shall be Canon PowerShot ELPH 510 or equal.
    f. CONTRACTOR shall provide nickel-cadmium rechargeable batteries suitable for the camera, with charger.
    g. Upon completion of the Project the camera will become the property of the OWNER.

1.7 MAINTENANCE AND SUPPLIES

A. CONTRACTOR's maintenance services shall include:
1. Provide toner or ink cartridges for printer/fax/copier/scanner as required.
2. Provide paper supplies for the copier, fax machine, and printer.
3. Provide colored dry markers.
4. Provide bottled water and disposable cups.
5. Provide coffee supplies, including cups, filters, coffee, sugar, sugar substitute (Equal or Sweet-N-Low), creamer, and stir-sticks.
6. Replenish contents of the first-aid kit as required.
7. Immediately repair malfunctioning, damaged, leaking, or defective field office systems and equipment.
8. Provide all computer supplies and pay for maintenance on the computer system.
9. Provide continuous maintenance and janitorial service of the field office and sanitary facilities. Clean the field office at least once per week and properly dispose of trash.
10. Provide soap, paper towels, cleansers, sanitary supplies, and janitorial implements in the ENGINEER's field office.

1.08 REMOVAL

A. Remove the field office and furnishings when directed by the ENGINEER. Deliver specified equipment to the OWNER.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01523

EMERGENCY TELEPHONE NUMBERS

PART 1 GENERAL

1.1 EMERGENCY TELEPHONE NUMBERS

A. The CONTRACTOR shall, at the CONTRACTOR'S expense, furnish to the ENGINEER an emergency phone number list for 24-hour contact during the construction period. Include numbers for office phones, pagers, and cellular phones, as applicable.

B. The list should include, but not be limited to:
1. CONTRACTOR'S office representative.
2. CONTRACTOR'S field superintendent.
3. CONTRACTOR'S foreman.
4. OWNER'S main office.
5. OWNER'S 24-hour emergency number.
6. The Authority's main office.
7. The Authority's 24-hour emergency number.
8. Project Engineer.
9. Project Inspector.
10. Utility companies such as gas, water, sewer, oil, telephone, cable, TV, etc.,
11. Other involved agencies.

C. CONTRACTOR shall add names and numbers given to him by ENGINEER and resubmit to ENGINEER as requested.

D. Emergency phone list must be submitted and considered acceptable to ENGINEER prior to the start of construction.

E. Phone list must be neatly typed or word processed and submitted on 8-1/2-inch by 11-inch paper.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01550

ACCESS ROADS AND PARKING AREAS

PART 1 GENERAL

1.1 DESCRIPTION

A. CONTRACTOR shall provide temporary construction roads, walks, parking areas, and appurtenances required during the Project for use by CONTRACTOR, OWNER's operations, other contractors working on the Project, and emergency vehicles. Temporary roads and parking areas shall be designed and maintained by CONTRACTOR and be fully usable in all weather conditions.

B. Use of Existing Access Roads:
   1. CONTRACTOR will be allowed to use OWNER'S existing roads upon obtaining OWNER's written permission.
   2. Prevent interference with traffic on existing roads and parking areas. At all times, keep access roads and entrances serving the Site clear and available to OWNER, OWNER's employees, emergency vehicles, and other contractors. Do not use these areas for parking or storage of materials.
   3. CONTRACTOR shall indemnify and hold harmless OWNER from expenses caused by CONTRACTOR's operations over existing roads and parking areas.
   4. Schedule deliveries to minimize use of driveways and entrances.

1.2 SITE ACCESS

A. Site Access: CONTRACTOR access to the Site shall be via the existing main gate on Pleasant Avenue or authorized temporary access location approved by OWNER.

1.3 TEMPORARY ROADS AND PARKING AREAS

A. Temporary Roads and Parking in Same Areas as Permanent Pavement: Construct temporary roads and parking areas adequate to support construction loads and to withstand exposure to traffic during the Project. Locate temporary roads and parking areas in same location as permanent roads and parking areas. Extend temporary roads and parking areas, within construction limits indicated, as required for construction operations.
   1. Coordinate elevations of temporary roads and parking areas with permanent roads and parking areas.
   2. Prepare subgrade, subbase, and base for temporary roads and parking areas per appropriate Specification sections in Division 2. Where required by subgrade conditions and construction loads and traffic, provide geotextile or geogrid on compacted subgrade for subbase support and separation of subbase and subgrade materials.
   3. Re-condition granular subbase of temporary roads and parking, including removing and properly disposing of contaminated material, re-grading, proof rolling, compacting, and testing.
   4. Delay installation of final courses of permanent bituminous pavement until road will not be subject to further heavy construction traffic. Repair damage to bituminous base course of pavement before installing permanent top courses.

1.4 TRAFFIC CONTROLS

A. Provide temporary traffic controls at intersections of temporary roads with public roads, and intersections of temporary roads with permanent access roads at the Site. Provide warning signs on permanent roads and drives, and provide "STOP" signs for traffic on temporary roads at entrances onto permanent pavement. Comply with requirements of authorities having jurisdiction.

1.5 CONTRACTOR PARKING

A. CONTRACTOR employee vehicles shall be parked in the area specifically designated in the Contract Documents.

B. Construction vehicles and equipment shall be parked in work areas off of permanent roads and parking areas, in areas of the Site designated for CONTRACTOR staging.

1.6 MAINTENANCE OF ROADS

A. General:
   1. CONTRACTOR shall maintain temporary roads and parking to continuously provide at the Site access for construction vehicles and trucks, OWNER vehicles, deliveries for OWNER, emergency vehicles, and parking areas for OWNER's personnel.
   2. Public roads shall be passable at all times unless a road closure is allowed in writing by authority having jurisdiction.
   3. When temporary roads and parking without hard surfacing become contaminated with soil and create a nuisance, remove contaminated material and replace with clean aggregate as required.
   4. Provide snow and ice removal for temporary roads and parking areas.

B. Clean paved roads and parking areas over which CONTRACTOR's vehicles travel. Cleaning shall be done a minimum of two times per week or more frequently as directed by ENGINEER, and shall be by mechanical sweeper. Roads to be cleaned include:
   1. Roads within limits of the Project.
   2. Permanent roads at Site from Site entrance to work areas and construction parking and staging areas.
   3. Public roads that require sweeping and cleaning due to CONTRACTOR's operations.

C. Dust resulting from CONTRACTOR's activities shall be controlled by CONTRACTOR to prevent nuisances at Site and nearby areas. Apply water or use other methods subject to ENGINEER's acceptance that will minimize airborne dust. Do not use water when water will cause hazardous or objectionable conditions such as ice, mud, ponds, and pollution.

D. Provide temporary, heavy-duty steel roadway plates to protect existing manholes, handholes, valve boxes, vaults, and similar buried facilities.

1.7 REMOVALS AND RESTORATION

A. Removals:

1. Remove temporary roads, walks, and parking areas that are not intended for, or acceptable for, integration into permanent pavement. Return areas of temporary roads, walks, and parking to preconstruction condition unless otherwise required by the Contract Documents. Remove temporary gates, fencing, and traffic controls associated with temporary roads and parking areas.
2. Where areas of temporary roads and parking will be permanently landscaped, remove pavement, aggregate, soil and other material that does not comply with requirements for fill or subsoil and landscaping. Remove and properly dispose of materials contaminated with oil, bitumen, and other petrochemical compounds, and other substances that might impair growth of plants and lawns.

B. Restoration:

1. Repair or replace paving, curbs, gutters, and sidewalks affected by temporary roads and parking, and restore to required conditions, per authorities having jurisdiction.
2. Restore to preconstruction conditions existing roads, walks, and parking areas damaged by CONTRACTOR, subject to approval of owner of roads, walks, and parking areas.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01561

SECURITY

PART 1 GENERAL

1.1 SCOPE

A. CONTRACTOR shall safely guard all the Work, products, equipment, and property from loss, theft, damage, and vandalism until Substantial Completion. CONTRACTOR's duty includes safely guarding OWNER's property in vicinity of the Work and other private property from injury or loss in connection with performance of the Work.

B. Costs for security specified in this Section shall be paid by CONTRACTOR.

C. Make no claim against OWNER for damage resulting from trespass.

D. Provide full compensation for damage to property of OWNER and others arising from failure to provide adequate security.

E. If fencing or barriers are breached or temporarily removed for the Work, provide and maintain temporary security fencing equal to existing in manner satisfactory to ENGINEER and OWNER.

F. CONTRACTOR's security measures shall ensure that access to the site for CONTRACTOR's work is controlled at all times while work is in progress during the day and site access shall be locked during off hours.

1.2 CONTRACTOR'S SITE ACCESS AND SECURITY PROCEDURES

A. Conform to requirements of Section 01550, Access Roads and Parking Areas.

B. Conform to OWNER's security procedures and access restrictions at Site throughout entire Project. CONTRACTOR, including Subcontractors and Suppliers, shall comply with the following:

1. CONTRACTOR shall abide by OWNER's and New York State Department of Health's mandated daily health screening throughout the course of this Contract. Refer to the memo at the end of this Section for all employee requirements.
2. Personnel Identification: All CONTRACTOR personnel shall wear at all times on-Site a badge bearing CONTRACTOR's name, employee's name and, as applicable, employee number.
3. Vehicle Identification: While on site, all CONTRACTOR vehicles, including employee vehicles, shall display vehicle identification tag clearly visible location on the dashboard. Vehicle tag shall be issued by the CONTRACTOR. Vehicle tag shall include the following information: Site name, CONTRACTOR name, contract number, vehicle license plate number and state of issue, name and employer of vehicle owner, and vehicle owner contact telephone number.
4. Parking: Do not park outside of designated CONTRACTOR parking area. Prepare and maintain parking area as required. Personal vehicles are not allowed outside CONTRACTOR parking area.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

ERIE COUNTY WATER AUTHORITY
EMPLOYEE NOTICE

TO: All Active Employees of the Erie County Water Authority

FROM: Daniel NeMoyer, Director of Human Resources

DATE: August 3, 2020

RE: New York State Mandated Daily Health Screening

Most Authority personnel have returned to their normal duties but may not realize the Erie County Water Authority (the "Authority") is still operating under a Declaration of Emergency. I urge each of you to read the Declaration of Emergency by going to the Authority's website or clicking on the blue hyperlinks contained in this Notice.

Please be aware that the New York State Department of Health mandates the Authority **perform daily health screenings of every single person who enters a "worksite"** owned, operated or controlled by the Authority.

A "**worksite" means** not only construction worksites and sites with work orders, but also Suite 350 of the Ellicott Square Building, and the buildings and grounds at the Service Center, the treatment plants, all pump stations and all tank locations.

All non-Authority personnel must complete a health screening questionnaire before such a person may enter an Authority worksite. No Authority personnel may allow an individual to enter an Authority worksite, unless that person has completed a questionnaire and has been given clearance to enter.

Effective Monday, August 10, 2020, all consultants, contractors, on-site vendors or other visitors will be required to **complete an online health screening questionnaire before entering an Authority worksite**. All non-Authority personnel must contact Matt Barrett, the Authority's Security Officer, and complete an Access Form to obtain a temporary EID to use the health screening portal. No person will be permitted on an Authority worksite without being cleared by the portal or by the HR Director.

In the interim, during the week of August 3, 2020, non-Authority personnel must complete a paper questionnaire. A copy of the paper questionnaire is attached. The paper questionnaire contains the instructions as to how to gain access to an Authority worksite. Please review these instructions and notify Matt Barrett if you require a non-Authority employee to enter an Authority worksite.

Thank you for your assistance with this State mandate.

ERIE COUNTY WATER AUTHORITY

INTERIM HEALTH SCREENING QUESTIONNAIRE

Pursuant to the mandates of the New York State Department of Health, acting in accordance with the Governor's Executive Orders relating to the COVID-19 pandemic, the Erie County Water Authority (the "Authority")is required to perform a health screenings for all consultants, contractors, on-site vendors or other visitors requesting access to any worksite under the Authority's control.

Effective Monday, August 10, 2020, all consultants, contractors, on-site vendors or other visitors will be required to **complete an online health screening questionnaire before entering an Authority worksite**. In the interim, non-Authority personnel must complete this two-page questionnaire.

Name:_____

Company:_____

Email Address:_____

Phone Number: _____

Authority Contact Person: _____

Y	N	Question:
☐	☐	Have you tested positive for COVID-19 in the last 14 days?
☐	☐	Have you had any close contact (within six feet, for more than ten minutes) with anyone who has tested positive for the COVID-19 virus within the last 14 days?
☐	☐	Have you experienced any of the following mild to severe COVID-19 symptoms within the last 14 days: • Cough • Shortness of breath • Difficulty breathing
☐	☐	Have you experienced **TWO** or more of the following COVID-19 symptoms within the last 14 days: • Chills • Repeated shaking • Muscle aches • Sore throat • Loss of smell or taste
___	___	

☐	☐	Have you had a fever of 100.4°F or higher in the past 24 hours?
☐	☐	Have you had any close contact with anyone with any of the above COVID-19 symptoms?
☐	☐	Are you living with anyone who is sick or quarantined due to the COVID-19 virus?
☐	☐	Have you visited any of the following states within the last 14 days?

- Alaska
- Alabama
- Arkansas
- Arizona
- California
- Delaware
- District of Columbia
- Florida
- Georgia
- Iowa
- Utah
- Idaho
- Illinois
- Indiana
- Kansas
- Kentucky
- Louisiana
- Maryland
- Minnesota
- Missouri
- Mississippi
- Montana
- Nebraska
- New Mexico
- North Carolina
- North Dakota
- Nevada
- Ohio
- Oklahoma
- Puerto Rico
- South Carolina
- Tennessee
- Texas

AFTER YOU COMPLETE THIS FORM, PLEASE EMAIL THE FORM TO THE AUTHORITY'S HR DIRECTOR/HIPPA OFFICER, DANIEL NeMOYER

dnemoyer@ecwa.org

SECTION 01562

PROTECTION OF WORK AND PROPERTY

PART 1 GENERAL

1.1 DESCRIPTION

A. CONTRACTOR shall be responsible for taking all precautions, providing all programs, and taking all actions necessary to protect the Work and all public and private property and facilities from damage as specified in the General Conditions and herein.

B. In order to prevent damage, injury or loss, CONTRACTOR'S actions shall include, but not be limited to, the following:

1. Store apparatus, materials, supplies, and equipment in an orderly, safe manner that will not unduly interfere with the progress of the Work or the Work of any other contractor or utility service company.

2. Provide suitable storage facilities for all materials, which are subject to injury by exposure to weather, theft, breakage, or otherwise.

3. Place upon the Work or any part thereof only such loads as are consistent with the safety of that portion of the Work.

4. Clean up frequently all refuse, rubbish, scrap materials, and debris caused by his operations, to the end that at all times the site of the Work shall present a safe, orderly and workmanlike appearance.

5. Provide barricades and guard rails around openings, for scaffolding, for temporary stairs and ramps, around excavations, elevated walkways and other hazardous areas.

C. CONTRACTOR shall not, except after written consent from proper parties, enter or occupy privately-owned land with men, tools, materials or equipment, except on easements provided herein.

D. CONTRACTOR shall assume full responsibility for the preservation of all public and private property or facility on or adjacent to the site. If any direct or indirect damage is done by or on account of any act, omission, neglect or misconduct in the execution of the Work by the CONTRACTOR, it shall be restored by the CONTRACTOR, at his expense, to a condition equal to that existing before the damage was done.

1.2 BARRICADES AND WARNING SIGNALS

A. Where Work is performed on or adjacent to any roadway, right-of- way, or public place, CONTRACTOR shall provide barricades, fences, lights, warning signs, danger signals, watchmen, and shall take other precautionary measures for the protection of persons or property and of the Work. Barricades shall be painted to be visible at night. From sunset to sunrise, CONTRACTOR shall furnish and maintain at least one light at each barricade. Sufficient barricades shall be erected to keep vehicles from being driven on or into Work under construction. CONTRACTOR shall furnish watchmen in sufficient numbers to protect the Work. CONTRACTOR'S responsibility for the maintenance of barricades, signs, lights, and for providing watchmen shall continue until the Project is accepted by OWNER.

1.3 TREE AND PLANT PROTECTION

A. CONTRACTOR shall protect existing trees, shrubs and plants on or adjacent to the site that are shown or designated to remain in place against unnecessary cutting, breaking or skinning of trunk, branches, bark or roots.

B. Materials or equipment shall not be stored or parked within the drip line.

C. Temporary fences or barricades shall be installed to protect trees and plants in areas subject to traffic.

D. Fires shall not be permitted under or adjacent to trees and plants.

E. Within the limits of the work, water trees and plants that are to remain, in order to maintain their health during construction operations.

F. Cover all exposed roots with burlap that shall be kept continuously wet. Cover all exposed roots with earth as soon as possible. Protect root systems from mechanical damage and damage by erosion, flooding, run-off or noxious materials in solution.

G. If branches or trunks are damaged, prune branches immediately and protect the cut or damaged areas with a nursery product specifically for horticultural use in a manner approved by the ENGINEER.

H. All damaged trees and plants that die or suffer permanent injury shall be removed when ordered by the ENGINEER and replaced by a specimen of equal or better quality.

I. Coordinate work in this section with requirements of Division 2 Technical Specifications.

1.4 PROTECTION OF EXISTING STRUCTURES

A. Underground Structures:

1. Underground structures are defined to include, but not be limited to, all sewer, water, gas, and other piping, and manholes, chambers, electrical conduits, tunnels and other existing subsurface work located within or adjacent to the limits of the Work.

2. All underground structures known to ENGINEER except water, sewer, electric, and telephone service connections are shown. This information is shown for the assistance of CONTRACTOR in accordance with the best information available, but is not guaranteed to be correct or complete.

3. CONTRACTOR shall explore ahead of his trenching and excavation Work and shall uncover all obstructing underground structures sufficiently to determine their location, to prevent damage to them and to prevent interruption to the services, which such structures provide. If CONTRACTOR damages an underground structure, he shall restore it to original condition at his expense.

4. Necessary changes in the location of the Work may be made by ENGINEER, to avoid unanticipated underground structures.

5. If permanent relocation of an underground structure or other subsurface facility is required and is not otherwise provided for in the Contract Documents, ENGINEER will direct CONTRACTOR in writing to perform the Work, which shall be paid for under the provisions of Article 11 of the General Conditions.

B. Surface Structures: Surface structures are defined as all existing buildings, structures and other facilities above the ground surface. Included with such structures are their foundations or any

extension below the surface. Surface structures include, but are not limited to, buildings, tanks, walls, bridges, roads, dams, channels, open drainage, piping, poles, wires, posts, signs, markers, curbs, walks and all other facilities that are visible above the ground surface.

C. Protection of Underground and Surface Structures:

1. CONTRACTOR shall sustain in their places and protect from direct or indirect injury all underground and surface structures located within or adjacent to the limits of the Work. Such sustaining and supporting shall be done carefully and as required by the party owning or controlling such structure. Before proceeding with the work of sustaining and supporting such structure, CONTRACTOR shall satisfy the ENGINEER that the methods and procedures to be used have been approved by the party owning same.

2. CONTRACTOR shall assume all risks attending the presence or proximity of all underground and surface structures within or adjacent to the limits of the Work. CONTRACTOR shall be responsible for all damage and expense for direct or indirect injury caused by his Work to any structure. CONTRACTOR shall repair immediately all damage caused by his work, to the satisfaction of the owner of the damaged structure.

D. All other existing surface facilities, including but not limited to, guardrails, posts, guard cables, signs, poles, markers, and curbs, which are temporarily removed to facilitate installation of the Work, shall be replaced and restored to their original condition at CONTRACTOR'S expense.

1.5 PROTECTION OF FLOORS, ROOFS, AND CEILINGS

A. CONTRACTOR shall protect floors, roofs and ceilings during the entire construction period.

B. Proper protective covering shall be used when moving heavy equipment, handling materials or other loads, when painting, handling mortar and grout and when cleaning walls and ceilings.

C. Use metal pans to collect all oil and cuttings from pipe, conduit, or rod threading machines and under all metal cutting machines.

D. Roofs and ceilings shall not be loaded without written permission of the ENGINEER.

1.6 PROTECTION OF INSTALLED PRODUCTS AND LANDSCAPING

A. Provide protection of installed products to prevent damage from subsequent operations. Remove protection facilities when no longer needed, prior to completion of Work.

B. Control traffic to prevent damage to equipment, materials and surfaces.

C. Provide coverings to protect equipment and materials from damage.
1. Cover projections, wall corners, and jambs, sills and soffits of openings, in areas used for traffic and for passage of products in subsequent work.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01563

TEMPORARY CONTROLS

PART 1 GENERAL

1.1 DESCRIPTION

A. Provide and maintain methods, equipment, and temporary construction, as necessary to provide controls over environmental conditions at the construction site and adjacent areas. Remove physical evidence of temporary facilities at completion of Work.

1.2 NOISE CONTROL

A. CONTRACTOR'S vehicles and equipment shall be such as to minimize noise to the greatest degree practicable. Noise levels shall conform to the latest OSHA standards and in no case will noise levels be permitted which interfere with the work of the OWNER or others.

1.3 DUST CONTROL

A. CONTRACTOR shall be responsible for controlling objectionable dust caused by his operation of vehicles and equipment, clearing or for any reason whatever. CONTRACTOR shall apply water or use other methods subject to the ENGINEER'S approval, which will keep dust in the air to a minimum.

1.4 PEST AND RODENT CONTROL

A. Provide rodent and pest control as necessary to prevent infestation of construction or storage area.
   1. Employ methods and use materials, which will not adversely affect conditions at the site or on adjoining properties.

1.5 WATER CONTROL

A. Provide methods to control surface water and water from excavations and structures to prevent damage to the Work, the site, or adjoining properties
   1. Control fill, grading and ditching to direct water away from excavations, pits, tunnels and other construction areas; and to direct drainage to proper runoff courses so as to prevent any erosion, damage or nuisance.

B. Provide, operate and maintain equipment and facilities of adequate size to control surface water.

C. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the site or to adjoining areas and in conformance with all environmental requirements.

1.6 POLLUTION CONTROL

A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.

B. Provide equipment and personnel, perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.
   1. Excavate and dispose of any contaminated earth off site and replace with suitable compacted fill and topsoil.

C. Take special measures to prevent harmful substances from entering public waters.
   1. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.

D. Provide systems for control of atmospheric pollutants.
   1. Prevent toxic concentrations of chemicals.
   2. Prevent harmful dispersal of pollutants into the atmosphere.

E. All CONTRACTOR'S equipment used during construction shall conform to all current federal, state and local laws and regulations.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01620

EQUIPMENT-GENERAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products.

B. Performance affidavits.

C. Shop drawings.

D. Equipment design.

E. Spare parts.

F. Equipment identification.

G. Standardization of grease fittings.

H. Anchors and supports.

I. Shop tests.

J. Installation of equipment.

K. Field tests.

L. Services of manufacturer’s representative.

M. Operation and maintenance instructions.

N. Failure of equipment to perform.

O. Guarantee.

P. Schedule of Equipment Testing and Manufacturer’s Services.

1.2 RELATED SECTIONS

A. Section 01331 - SHOP DRAWING PROCEDURES

B. Section 01640 – TRANSPORTATION AND HANDLING OF MATERIALS AND EQUIPMENT

D. Section 01660 – STORAGE OF MATERIAL

C. Section 01751 – STARTING AND PLACING EQUIPMENT IN OPERATION

E. Section 01781 - OPERATION AND MAINTENANCE DATA

1.3 PRODUCTS

A. Products - Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

C. Provide interchangeable components of the same manufacturer, for components being replaced.

1.4 PERFORMANCE AFFIDAVITS

A. Provide performance affidavits for products as required in the individual technical sections.

B. Submit performance affidavits in conformance with Section 01331 Shop Drawing Procedures.

C. By these affidavits, each manufacturer must certify to the CONTRACTOR and the OWNER, jointly, that he has examined the Contract Documents and that the equipment, apparatus, process or system he offers to furnish will meet in every way the performance requirements set forth in the Contract Documents. Equipment design, manufacturing and assembly specifications are an integral part of the performance requirements.

D. Shop drawings will not be reviewed prior to receipt by the ENGINEER of an acceptable performance affidavit.

E. The performance affidavit must be signed by an officer (vice president or higher) of the basic corporation, partnership or company manufacturing the equipment, and witnessed by a notary public.

F. The performance affidavits shall be in the following format:

Addressed to: (CONTRACTOR) and (OWNER)
Reference: Contract No. _____ (Project)
Text: "(manufacturer's name) has examined the Contract Documents and verified that the (product) meets in every way the performance requirements and design specifications set forth in Section(s) ___of the Contract Documents."
Signature: Corporate officers shall be vice president or higher (unless statement authorizing signature is attached).
Notary: Signature(s) must be notarized.

1.5 SHOP DRAWINGS

A. Provide shop drawing submittals as specified in Section 01331.

B. Shop drawing submittals shall include all descriptive data, performance characteristics, material specifications, spare parts list, drawings, piping diagrams, wiring schematics, and shall be complete and accurate to indicate item-by-item compliance with the Contract Documents.

C. All catalog cuts, manufacturer's specifications, drawings, and verbal descriptions shall be clearly marked to allow identification of the specific products used.

D. If the submittal deviates from the requirements of the Specifications in any way, it shall be clearly marked in the submittal with the justifying reason stated for evaluation by the ENGINEER.

E. Electrical and control submittals shall include a verbal description of the functions, metering equipment, alarm points, alarm sequences, and any other specific features provided.

F . All electrical equipment submittals shall be in accordance with Division 16, Electrical Specifications.

1.6 EQUIPMENT DESIGN

A. Equipment and appurtenances shall be designed in conformity with ANSI, ASME, IEEE, NEMA and other generally accepted applicable standards.

B. Equipment and appurtenances shall be of rugged construction and of sufficient strength to withstand all stresses which may occur during fabrication, testing, transportation, installation, all conditions of operation, or as required by Specifications.

C. All bearings and moving parts shall be adequately protected by bushings or other approved means against wear, and provision shall be made for adequate lubrication by readily accessible devices.

D. Details shall be designed for appearance as well as utility. Protruding members, joints, corners, gear covers, etc., shall be finished in appearance. All exposed welds on machinery shall be ground smooth and the corners of structural shapes shall be rounded or chamfered.

E. Machinery parts shall conform within allowable tolerances to the dimensions shown on the working drawings. The corresponding parts of identical machines shall be made interchangeable.

F. All machinery and equipment shall be safeguarded in accordance with the safety codes of the ANSI and OSHA and the State Industrial Code. All rotating shafts, couplings or other moving pieces of equipment shall be provided with suitable protective guards of sheet metal or wire mesh neatly and rigidly supported. Guards shall be removable as necessary to provide access for repairs.

G. Details promoting maintenance, ease of replacing parts, and lubrication shall be a prime consideration in design.

H. Products shall be designed for corrosion resistance and shall not be constructed of materials, which may prohibit ease of maintenance due to corrosion. All fasteners on areas requiring access for maintenance and lubrication shall be Type 316 stainless steel unless otherwise specified. Zinc or cadmium plated fasteners for these areas shall not be used.

1.7 SPARE PARTS

A. Provide spare parts as required by individual Specification Sections and Section 01783.

B. Provide spare parts that are identical and interchangeable with original parts.

C. For each part (or group of small parts), provide a tag, which shall carry the following information: Identity of the equipment the part is for; identity or name of the part itself; date and manufacturer's name and identification number of the part.

1.8 EQUIPMENT IDENTIFICATION

A. Each piece of equipment shall be provided with a substantial brass or stainless steel nameplate, securely fastened in a conspicuous place and clearly inscribed with the manufacturer's name, year of manufacture, serial number and principal rating data.

B. Each piece of equipment shall be provided with an engraved plastic nameplate clearly indicating equipment name and designation. Plate shall be black with white lettering. Lettering shall be minimum 3/4-inch high. CONTRACTOR shall adhesive mount or hang plaque with bronze chains.

1.9 STANDARDIZATION OF GREASE FITTINGS

A. Provide grease fittings of the hydraulic type, Alemite #1600 Series or Lincoln.

B. Coordinate grease fittings on all mechanical equipment to be compatible with a single type of grease gun.

1.10 ANCHORS AND SUPPORTS

A. Obtain and install all necessary guides, bearing plates, anchor and attachment bolts, working drawings for installation, templates and all other appurtenances necessary for the installation of the equipment specified. Subcontractors furnishing equipment shall also furnish anchors and templates to the CONTRACTOR.

B. Anchor bolts shall be of size and strength suitable for purpose intended and shall be in accordance with Section 05500 and the individual specification sections.

C. Pipe sleeves or other means of adjusting anchor bolts shall be provided where indicated or needed. Equipment shall be leveled by first using sitting nuts on the anchor bolts and then filling the space between the equipment base and concrete pedestal with grout. Where equipment bases (i.e., pumps) are installed with grout holes, subsequent to field testing, those bases shall be totally filled with grout.

D. Provide grout as required by the Contract Documents.

E. Provide concrete equipment pads or housekeeping pads for all mechanical, heating and ventilating, plumbing and electrical equipment. Coordinate pad placement to confirm dimensions, location and anchor requirements.

1.11 SHOP TESTS

A. Arrange shop tests of the equipment indicated in the Schedule of Equipment Testing and Manufacturer’s Services and individual equipment specification sections.

B. Arrange for the ENGINEER to witness performance tests in the manufacturer’s shop, if required by the individual specification section.

C. Pump shop tests shall be conducted and reported in accordance with the Standards established by the Hydraulic Institute. Pump tolerances shall be within limits acceptable by these standards.

D. Demonstrate by the tests that the equipment characteristics, including any specified pressure, duty, capacity, rating, efficiency, performance, function or other special requirements, comply fully with the requirements of the Contract Documents and that it will operate in the manner specified.

E. Submit certified copies of the manufacturer’s test data and interpreted results as required by Section 01331 Shop Drawing Procedures.

1.12 INSTALLATION OF EQUIPMENT

A. Install all equipment strictly in accordance with recommendations of the manufacturer.

B. Submit all installation instructions as required by Sections 01331 and 01730.

C. Install pumps in accordance with Division 11.

D. Install equipment on the foundations as specified in this section and at the locations and elevations shown on the Contract Drawings.

E. Install any additional wiring and conduit systems required for complete operational systems.

1.13 FIELD TESTS

A. Perform field tests as specified in this Section and in the individual specification sections.

B. Preliminary Field Tests - Furnish all labor, materials and instruments to perform all preliminary field tests of equipment. Make all changes, adjustments and replacements required to comply with the requirements of the Contract Documents. Demonstrate that:
   1. Equipment is installed in the location and orientation specified in Project Manual or shown on the Drawings.
   2. Equipment is prepared for operation in strict accordance with the Contract Documents and with manufacturer's recommendations.

C. Final Acceptance Tests - Perform final tests prior to startup. Provide services of the manufacturer's representative if required by the Schedule of Equipment Testing and Manufacturer's Services. Furnish labor, fuel, lubricants, energy, water and all other materials, equipment and instruments necessary for all acceptance tests. Schedule final acceptance test to consist of the following checks as a minimum:
   1. That the equipment is properly lubricated, adjusted and aligned.
   2. That the equipment meets the specified performance requirements in every detail and performs its intended function without any unusual vibration, noise or other signs of possible malfunction.
   3. Perform motor field tests as specified.
   4. Where equipment is capable of operation in more than one mode or equipment performs more than one function, each operational mode or function shall be checked for proper performance.
   5. All controls, both mechanical and electrical, shall be checked individually for proper connection and operation.

1.14 SERVICE OF MANUFACTURER'S REPRESENTATIVE

A. Arrange for the equipment manufacturer to furnish the services of a qualified representative. The time period for the supervision and instructions is stated in the Schedule of Equipment Testing and Manufacturer's Services. Where no specific duration of visit is listed, the length of time shall be such to allow the equipment representative ample time to follow the requirements outlined in this Section and the individual technical section covering the particular equipment item.

B. The CONTRACTOR shall be responsible for any additional time required for the manufacturer's representative to resolve equipment installation and/or operation problems due to a lack of coordination between the supplied equipment and the Contract Documents such as, but not limited to, dimensions, electrical problems or performance.

C. Arrange for the equipment representative to visit the plant on occasions after initial start-up and during the first year of operation if required by the individual Specification Sections. The purpose of these visits shall be to review equipment operation, assist the operators in correcting operational problems and basic inspection of the equipment.

D. Installation Service - Certify installation, recommend or make adjustments and supervise field testing of equipment.

E. Instructions - Instruct the OWNER's operating personnel in operation and maintenance of equipment. A written report by the representative covering instructions given shall be sent to the OWNER, ENGINEER and CONTRACTOR.

1. General CONTRACTOR shall prepare and maintain a log of all training provided to OWNER. The log shall include date, time, duration, list of attendees, copy of agenda, and summary of which equipment the training was for. Log shall be organized similar to the schedule herein. Log shall be submitted prior to final payment request.

F. Certification of Equipment Compliance - Submit written certification jointly to the OWNER, the ENGINEER and the CONTRACTOR that the equipment supplied or manufactured by their organization has been installed and tested to their satisfaction, and that all final adjustments thereto have been made. Certification shall include date of final acceptance field test, as well as a listing of all persons present during tests.

1.15 OPERATION AND MAINTENANCE INSTRUCTIONS

A. Provide operation and maintenance instructions as specified in Section 01781.

1.16 FAILURE OF EQUIPMENT TO PERFORM

A. Promptly correct by replacement or otherwise any defects in the equipment, or failure to meet the guarantees or performance requirements.

B. If CONTRACTOR fails to make the corrections, or if the improved equipment again fails to meet the guarantees or specified requirements, the OWNER, notwithstanding his having made partial payment for work and materials which have entered into the manufacture of said equipment, may reject said equipment and order the CONTRACTOR to remove it from the premises at the CONTRACTOR's expense.

1.17 GUARANTEE

A. Provide equipment guarantees in accordance with Articles 6 and 13 of the General Conditions and Article 13.07 of the Supplementary Conditions. Guarantee requirements may be added to or modified in the individual Specification Sections.

B. By supplying a product under the contract, the manufacturer and CONTRACTOR jointly agree that all manufacturer's warranties, expressed or implied, pass through the CONTRACTOR to OWNER. This warranty obligation starts on the date of substantial completion and survives any inspection by, delivery to, acceptance by or payment by the OWNER or CONTRACTOR for the goods furnished by the manufacturer. Further, this warrants that the equipment designed, manufactured and/or used meets all applicable federal, state and local laws, rules and regulations, including applicable OSHA standards. This requirement does not change or limit the requirements for performance affidavits described in Article 1.4.

1.18 EQUIPMENT SCHEDULE

A. The attached schedule outlines the various items of equipment specified in other sections and lists the responsibilities of the equipment manufacturer for each Section of the specifications.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01630

SUBSTITUTIONS

PART 1 GENERAL

1.1 PRODUCTS LIST

A. Within thirty (30) days after execution of Agreement, submit electronic PDF of complete list of products proposed for the Work tabulated by Sections and with complete data and identification.

1.2 SUBSTITUTIONS

A. Within thirty (30) days after execution of Agreement, ENGINEER will consider formal request from CONTRACTOR for substitution of products or construction methods. Any item substituted as an "or equal" shall be considered a substitution.

B. Submit electronic PDF of request for substitution. Include in request the following:

1. Complete data substantiating compliance of proposed substitution with Contract Documents.

2. For products:

    a. Product identification, including the name and address of the manufacturer.

    b. Literature of the manufacturer complete with product description, performance and test data, and reference standards.

    c. Samples.

    d. Name and address of similar projects on which product was used, and date of installation.

3. For construction methods:

    a. Detailed description of proposed method.

    b. Drawings illustrating methods.

4. Itemized comparison of proposed substitution with product or method specified.

5. Data relating to changes in construction schedule.

6. Relation to separate contracts, if any.

7. Accurate cost data on proposed substitution in comparison with product or method specified.

C. In making request for substitution the CONTRACTOR represents:

1. CONTRACTOR has personally investigated proposed product or method, and determined that it is equal or superior in all respects to that specified.

2. CONTRACTOR will provide the same or better guarantee for substitution as for product or method specified.

3. CONTRACTOR will coordinate installation of accepted substitution into Work, making such changes as required in all respects.

4. CONTRACTOR waives all claims for additional costs related to substitution that consequently become apparent.

5. Cost data is complete and includes all related costs under this Contract.

D. Substitutions will not be accepted if:

1. They are only shown or implied on Shop Drawings.

2. Acceptance will require substantial revision of Contract Documents.

3. Substitutions would change design concepts or Specifications.

4. Substitutions would delay completion of the Work.

5. Substitutions involve items for which a manufacturer was declared at time of bidding.

6. Substitution is not compatible with existing SCADA equipment.

E. ENGINEER will determine whether substitute brands or products are equal to those specified in the Contract Documents.

F. If the ENGINEER determines that a substitute is not equal to that named in the Specification, the CONTRACTOR shall furnish one of the brands or products specified, at no additional cost to the OWNER.

G. Engineering Costs:

1. CONTRACTOR shall reimburse the OWNER for actual evaluation costs of ENGINEER and his consultants if:

a. Proposed substitute does not meet requirements of the Drawings and Specifications and is rejected.

b. Acceptance of proposed substitute requires changes to the Work.

2. CONTRACTOR shall reimburse OWNER for all associated engineering costs, including redesign, additional Shop Drawing reviews, investigations, consultant fees, and revision of the Contract Documents required because of the substitution.

3. Costs of ENGINEER shall be the sum of the following:

a. Salary costs.

b. Overhead costs.

c. Out-of-pocket costs.

d. Consultant fees.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01640

TRANSPORTATION AND HANDLING OF MATERIALS AND EQUIPMENT

PART 1 GENERAL

1.1 DESCRIPTION

A. CONTRACTOR shall make all arrangements for transportation, delivery and handling of equipment and materials required for prosecution and completion of the Work. Included in CONTRACTOR'S work shall be acceptance of consignment and coordination of equipment deliveries for equipment purchased by OWNER.

B. Shipments of materials to CONTRACTOR or Subcontractors shall be delivered to the site only during regular working hours. Shipments shall be addressed and consigned to the CONTRACTOR giving name of Project, street number and city. Shipments shall not be delivered to OWNER except where otherwise directed.

C. If necessary to move stored materials and equipment during construction, CONTRACTOR shall move or cause to be moved materials and equipment without any additional compensation.

1.2 DELIVERY

A. Arrange deliveries of products in accordance with construction schedules and in ample time to facilitate inspection prior to installation.

B. Coordinate deliveries to avoid conflict with Work and conditions at site and to accommodate the following:
   1. Work of other contractors, or OWNER.
   2. Limitations of storage space.
   3. Availability of equipment and personnel for handling products.
   4. OWNER'S use of premises.
   5. Work under other construction projects on OWNER'S site.

C. Do not have products delivered to project site until related Shop Drawings have been approved by the ENGINEER.

D. Do not have products delivered to site until required storage facilities have been provided.

E. Have products delivered to site in manufacturer's original, unopened, labeled containers. Keep ENGINEER informed of delivery of all equipment to be incorporated in the Work.

F. Partial deliveries of component parts of equipment shall be clearly marked to identify the equipment, to permit easy accumulation of parts and to facilitate assembly.

G. Immediately on delivery, inspect shipment to assure:
   1. Product complies with requirements of Contract Documents and reviewed submittals.
   2. Quantities are correct.
   3. Containers and packages are intact, labels are legible.
   4. Products are properly protected and undamaged.

1.3 PRODUCT HANDLING

A. Provide equipment and personnel necessary to handle products by methods to prevent soiling or damage to products or packaging.

B. Provide additional protection during handling as necessary to prevent scraping, marring or otherwise damaging products or surrounding surfaces.

C. Handle products by methods to prevent bending or overstressing.

D. Lift heavy components only at designated lifting points.

E. Materials and equipment shall at all times be handled in a safe manner and as recommended by manufacturer or supplier so that no damage will occur to them. Do not drop, roll or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01660

STORAGE OF MATERIAL

PART 1 GENERAL

1.1 DESCRIPTION

A. Store and protect materials in accordance with manufacturer's recommendations and requirements of Specifications.

B. CONTRACTOR shall make all arrangements and provisions necessary for the storage of materials and equipment. All excavated materials, construction equipment, and materials and equipment to be incorporated into the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work. Materials and equipment shall be kept neatly and compactly stored in locations that will cause a minimum of inconvenience to other contractors, public travel, adjoining owners, tenants and occupants. Arrange storage in a manner to provide easy access for inspection.

C. CONTRACTOR shall be consigned responsibility for scheduling, coordination of delivery and manufacturer's representatives' services, on-site storage, and handling of equipment items purchased directly by OWNER for this project. CONTRACTOR shall make provisions for temporary storage, if required, and all handling of said equipment items.

D. Areas available on the construction site for storage of material and equipment shall be as shown or approved by the ENGINEER.

E. Materials and equipment which are to become the property of the OWNER shall be stored to facilitate their inspection and insure preservation of the quality and fitness of the Work, including proper protection against damage by freezing and moisture. They shall be placed inside storage areas unless otherwise acceptable to OWNER.

F. Lawns, grass plots or other private property shall not be used for storage purposes without written permission of the property owner or other person in possession or control of such premises.

G. CONTRACTOR shall be fully responsible for loss or damage to stored materials and equipment.

H. Do not open manufacturer's containers until time of installation unless recommended by the manufacturer or otherwise specified.

I. Do not store products in the structures being constructed unless approved in writing by the ENGINEER.

1.2 UNCOVERED STORAGE

A. The following types of materials may be stored out-of-doors without cover:
   1. Reinforcing steel.
   2. Precast concrete items.
   3. Masonry block and brick.
   4. Castings.
   5. Manholes and exterior buried pipe.

B. Store the above materials on wood blocking so there is no contact with the ground.

1.3 COVERED STORAGE

A. The following types of materials may be stored out-of-doors if covered with material impervious to water:
   1. Rough lumber.
   2. Piping.

B. Tie down covers with rope and slope to prevent accumulation of water on covers.

C. Store materials on wood blocking.

1.4 FULLY PROTECTED STORAGE

A. Store all products not named above in buildings or trailers, which have a concrete or wooden floor, a roof, and fully closed walls on all sides.

B. Provide heated storage space for materials, which would be damaged by freezing.

C. Protect mechanical and electrical equipment from being contaminated by dust, dirt and moisture.

D. Maintain humidity at levels recommended by manufacturers for electrical and electronic equipment.

1.5 MAINTENANCE OF STORAGE

A. Maintain periodic system of inspection of stored products on scheduled basis to assure that:
   1. State of storage facilities is adequate to provide required conditions.
   2. Required environmental conditions are maintained on continuing basis.
   3. Products exposed to elements are not adversely affected.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01720

SURVEY DATA

PART 1 GENERAL

1.1 DESCRIPTION

A. CONTRACTOR shall keep neat legible notes of all measurements and calculations made by him while surveying and laying out the Work. Furnish copies of notes to ENGINEER every two weeks or as requested.

B. When any survey monument or property marker, whether of stone, concrete, wood, or metal, or a mark on the pavement, designating the lines of private property, is in the line of any trench or other construction work and may have to be removed, the CONTRACTOR shall notify the ENGINEER in writing at least 24-hours in advance of removal. Under no circumstances shall such monument or marker be removed or disturbed by the CONTRACTOR or by any of his subcontractors, employees, or agents, without a written order from the ENGINEER. The CONTRACTOR shall furnish the necessary labor and materials required in resetting any monument or property marker under the direct supervision of the ENGINEER. Should any monument be destroyed through accident, neglect or other cause, the CONTRACTOR will be required at his own expense to employ a licensed surveyor acceptable to the ENGINEER to reestablish the monument or marker.

1.2 PIPE ELEVATIONS

A. CONTRACTOR shall take survey elevation of the top of the newly installed pipe at all tees and changes in vertical alignment.

B. Survey elevations shall be performed to NGVD29 datum and New York State Plane Coordinates West Zone (3103)

1.3 SUBMITTALS

A. One copy of all notes shall be furnished to the ENGINEER and one copy furnished to the OWNER with Record Drawings.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01723

CUTTING AND PATCHING

PART 1 GENERAL

1.1 DESCRIPTION

A. CONTRACTOR shall perform cutting and coring, and rough and finish patching of holes and openings in existing construction.

B. Cutting, coring, rough patching, and finish patching shall be by CONTRACTOR.

C. Provide cutting, coring, fitting and patching, including attendant excavation and backfill, required to complete the Work, and to:
   1. Remove and replace defective Work.
   2. Remove samples of installed Work as specified or required for testing.
   3. Remove construction required to provide for specified alterations or addition to existing work.
   4. Uncover Work for ENGINEER's observation of covered Work or observation by authorities having jurisdiction.
   5. Connect to completed Work not performed in proper sequence.
   6. Remove or relocate existing utilities and pipes that obstruct the Work in locations where connections must be made.
   7. Make connections or alterations to existing or new facilities.

D. Structural Elements: Do not cut or patch structural elements in manner that would change structural element's load-carrying capacity as load deflection ratio.

E. Operating Elements: Do not cut or patch operating elements in manner that would reduce their capacity to perform as intended. Do not cut or patch operating elements or related components in manner that would increase maintenance requirements or decrease operational life or safety.

1.2 SUBMITTALS

A. Action Submittals: Submit the following:
   1. Cutting and Patching Request:
      a. Submit written request to ENGINEER well in advance of executing cutting or alteration affecting:
         1) Design function or intent of Project.
         2) Work of OWNER.
         3) Structural value or integrity of an element of the Project.
         4) Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
         5) Efficiency, operational life, maintenance, or safety of operational elements.
         6) Visual qualities of sight-exposed elements.
      b. Request shall include:
         1) Identification of Project and contract name and number.
         2) Description of affected Work of CONTRACTOR and work of others.
         3) Necessity for cutting.
         4) Effect on work of OWNER or other contractors, or on structural or weatherproof integrity of Project.
         5) Description of proposed Work, describing: scope of cutting and patching; trades who will be executing the Work; products proposed to be used; extent of refinishing; schedule of operations; alternatives to cutting and patching, if any.
         7) Designation of party responsible for cost of cutting and patching, when applicable.

8) Written permission of other contractors whose work will be affected.

2. Should conditions of Work, or schedule, indicate a change of materials or methods, submit written recommendation to ENGINEER including:
   a. Conditions indicating change.
   b. Recommendations for alternative materials or methods.
   c. Submittals as required for substitutions.

B. Informational Submittals: Submit the following:
   1. Submit written notice designating time Work will be uncovered, to provide for observation. Do not begin cutting or patching operations until accepted by ENGINEER.
   2. X-ray Investigations:
      a. Proposed method of investigation.
      b. Report of X-ray evaluation of floors and walls to be cut or core-drilled.

C. Conform to submittal requirements in Specifications for application and installation of materials used for patching.

1.3 WARRANTY

A. Replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials in manner that does not void required or existing warranties.

PART 2 PRODUCTS

2.1 MATERIALS, GENERAL

A. Use materials in conformance with the Contract Documents.

B. If not shown or indicated in the Contract Documents, use materials and products that are identical to existing materials and products affected by cutting and patching Work.

C. For exposed surfaces, use materials that visually match existing adjacent surfaces to fullest extent possible. If identical materials are unavailable or cannot be used, use materials whose installed performance will equal or surpass that of existing materials.

PART 3 EXECUTION

3.1 GENERAL

A. Perform cutting and coring in such manner that limits extent of patching.

B. Core drill holes to be cut through concrete and masonry walls, slabs, or arches, unless otherwise accepted by ENGINEER in writing.

3.2 INSPECTION

A. Examine surfaces to be cut or patched and conditions under which cutting or patching are to be performed before starting cutting or patching Work.

B. Report unsatisfactory or questionable conditions to ENGINEER in writing. Do not proceed with the Work until unsatisfactory conditions are corrected.

C. In advance of Work that includes cutting into existing floor, slabs, and walls, use X-ray or other non-destructive methods accepted by ENGINEER to determine location of reinforcing steel, electrical conduits, and other items embedded in floors or walls. Provide to ENGINEER written report of findings of evaluation. Perform X-ray investigation sufficiently in advance of cutting Work to allow time to identify and implement alternatives if changes to the Work are necessary because of conduit or other features in floor or wall.

3.3 PREPARATION

A. Provide temporary support as required to maintain structural integrity of Project, to protect adjacent Work from damage during cutting, and to support the Work to be cut.

B. Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that will be exposed during cutting and patching operations.
   1. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
   2. Do not cut existing pipe, conduit, ductwork, or other utilities serving facilities scheduled to be removed or relocated until provisions have been made to bypass them.

3.4 CORING

A. Perform coring with non-impact rotary tool using diamond core drills. Size holes for pipe, conduit, sleeves, equipment or mechanical seals, as required.

B. Protect existing equipment, utilities and adjacent areas from water and other damage covered by drilling operations.

C. Vacuum or otherwise remove slurry or tailings from the Work area following drilling.

D. Do not core-drill through electrical conduit or other utility lines embedded in walls or floors without approval of ENGINEER. To extent possible, avoid cutting reinforcing steel in floors and walls. After core-drilling, coat exposed concrete and steel with Sika 62 or equal before installing the utility or equipment through the penetration.

3.5 CUTTING

A. Cut existing construction using methods least likely to damage elements retained or adjoining construction, and that will provide proper surfaces to receive installation or repair.
   1. In general, use hand or small power tools designed for sawing or grinding, not hammering and chopping.
   2. Cut through concrete and masonry using concrete wall saw with diamond saw blades.
      a. Provide for control, on both sides of walls, of slurry generated by sawing.

B. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Provide temporary covering over openings where not in use.

C. To avoid marring existing finished surfaces, cut or drill from exposed or finished side into concealed side.

D. Provide adequate bracing of area to be cut prior to start of cutting.

E. Provide equipment of adequate size to remove cut panel.

3.6 PATCHING

A. Patch construction by filling, repairing, refinishing, closing-up and similar operations following performance of other Work. Patch with durable seams that are as inconspicuous as possible. Provide materials and comply with installation requirements specified, in the Specifications.

B. Where feasible, test patched areas to demonstrate integrity of installation.

C. Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

D. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in manner that eliminates evidence of patching and refinishing.
   1. For continuous surfaces, refinish to nearest intersection.
   2. For an assembly, refinish entire unit.

E. Patch, repair or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.7 CLEANING

A. Clean areas and spaces where cutting, coring and patching are performed. Clean piping, conduit, or similar constructions before applying paint or other finishing materials. Restore damaged coverings of pipe and other utilities to original condition.

END OF SECTION

SECTION 01730

INSTALLATION

PART 1 GENERAL

1.1 DESCRIPTION

A. This Section describes general requirements for installing products. Additional product installation requirements are included in the Specification Sections

1.2 INSTALLATION QUALITY ASSURANCE AND QUALITY CONTROL

A. Provide appropriate quality assurance for installing products, and provide quality control over Suppliers, products, services, Site conditions, and workmanship to provide Work of specified quality.

B. Install products in accordance with approved Shop Drawings, the Contract Documents, and Supplier's installation data. If Supplier's data conflict with the Contract Documents, obtain clarification from ENGINEER before proceeding.
   1. Supplier's installation data includes Supplier's written instructions; drawings; illustrative, wiring and schematic diagrams; diagrams identifying external connections, terminal block numbers and internal wiring; and all other such information pertaining to installation of products and equipment that is not furnished with Shop Drawings. Included are all Supplier's printed installation instructions, including those that may be attached to equipment.

C. CONTRACTOR's installers shall be experienced in the types of Work required.

1.3 SERVICES OF SUPPLIER'S REPRESENTATIVE

A. When specified, provide competent, qualified representatives of product Supplier to provide services specified, including supervising installation, adjusting, and testing of products.

PART 2 PRODUCTS

2.1 EQUIPMENT DRIVE GUARDS

A. Equipment Drive Guards:
   1. Unless otherwise shown or specified, provide all-metal guards conforming to 29 CFR 1910, Subpart O, with equipment driven by open shafts, belts, chains, pulleys, sheaves, or gears. Guards shall enclose drive and driven mechanism.
   2. If material of guards is not otherwise specified, guards shall be galvanized sheet steel, galvanized woven wire, or expanded metal set in a frame of galvanized steel members, as appropriate.
   3. Secure guards in position by steel braces or straps, securely fastened to frame of equipment, floor, or wall as required.
   4. Fastenings shall permit removal of guards for servicing equipment.

PART 3 EXECUTION

3.1 INSTALLATION

A. General:
1. Prior to installing products, complete preparation of surfaces on which products are to be installed. Prior to installing products on new concrete, concrete shall achieve sufficient compressive strength to support the products.
2. Maintain Work area in a broom-clean condition during installation of products.
3. Use proper tools to assemble products. Do not deform or mar surface of shafts, nuts, and other parts.
4. Do not support rigging from building or structure without written permission of ENGINEER. CONTRACTOR is responsible for and shall repair all damage to building or structure resulting from his operations.
5. During installation, maintain products in neutral position and do not exert undue stress on products.
6. Tighten connections requiring gaskets evenly all around to ensure uniform stress over entire gasket.
7. Use only an oil bath heater to expand couplings, gears, and other mechanical components to be expanded for installation. Do not force or drive couplings, gears, and other mechanical components onto equipment shafts, or subject them to open flame or torch.
8. Do not alter or repair products and do not burn or weld products unless specified in the Contract Documents or allowed by ENGINEER.
9. Provide plugs in lubrication holes to prevent entry of foreign material.

B. Setting and Erection:
1. Wedging is not allowed. Use minimum number of shims required in leveling equipment being installed. Shims shall be Type 304L stainless steel, clean and free of slag. Provide shims, filling pieces, keys, packing, red or white lead grout, and other products necessary to properly align, level, and secure apparatus in place. Install products plum and level, unless otherwise specified, and demonstrate plumbness and level to ENGINEER. Bring parts to proper bearing after installation and erection.
2. Using experienced millwrights, carefully set and align equipment on foundations, after equipment soleplates or baseplates, as applicable, have been shimmed to true alignment at anchorages. Set anchorages in place and tighten nuts against shims. Check bedplates or wing feet of equipment after securing to foundations and, after confirming alignments, grout soleplates or baseplates, as applicable, in place.
3. Anchorages:
    a. Provide anchorage setting drawings in time to coordinate with fabrication of products and the Work at the Site.
    b. Anchorages shall conform to Section 05505, Concrete and Masonry Anchors. Requests for approval of alternate anchorage methods shall be per the General Conditions and Section 01630, Substitutions.
4. Ream misaligned holes. Do not “force” bolts or keys.
5. Where applicable, properly align equipment with associated piping and utility connections, without exerting undue stress on connecting piping and utilities.

C. Alignment and Leveling:
1. Verify that all shafts, couplings, and sheaves are properly aligned and adjust to required tolerances.
2. Align couplings while equipment is free from external loads.
3. Check angular and parallel alignment and record actual alignment and submit to ENGINEER. Alignment shall be within tolerances specified in Contract Documents and as recommended by Supplier of the product.
4. Use laser indicators or dial indicators for checking angular and parallel alignment. Using dial indicators requires that, during rotation of half couplings in performance of test, dial indicator shall be maintained in same relative position, and dial indicator readings taken at same place on circumference of coupling.

D. Threaded Connections: Apply a molybdenum disulfide, anti-seize compound to threads in mechanical connections such as bolts, studs, cap screws, tubing, and other threads, unless otherwise specified.

END OF SECTION

SECTION 01731

CONNECTIONS TO EXISTING FACILITIES

PART 1 GENERAL

1.1 DESCRIPTION

A. Perform all construction necessary to complete connections and tie-ins to existing facilities.

B. Keep existing facilities in operation unless otherwise specifically permitted in these Specifications or approved by OWNER.

C. CONTRACTOR shall perform all construction activities so as to avoid interference with operations of the facility and the work of others, and the safety and quality of the finished water.

D. Related work specified elsewhere:
   1. Section 01311 - Coordination with Owner's Operations.
   2. Section 01723 - Cutting and Patching.
   3. Divisions 2-16 - Technical Specifications.

1.2 GENERAL INFORMATION

A. Construction of interconnections is subject to CONTRACTOR'S submittal of materials, detailed procedures, schedules, etc. required by the contract. The following is for information only and the CONTRACTOR is responsible for all interconnections and abandonments.

B. The CONTRACTOR shall not operate existing valves. Once new piping and equipment is placed into service, CONTRACTOR shall not operate those valves.

C. The OWNER only shall operate existing valves. The CONTRACTOR is advised that watertight conditions may not exist when existing valves are closed. The CONTRACTOR shall consider this in his bid.

D. The CONTRACTOR shall have all equipment, manpower, and materials required for the construction on site and ready for use and/or prior to commencing any shutdown or removing any existing facilities.

E. The CONTRACTOR shall schedule and coordinate his work with others in accordance with the specifications and shall coordinate all proposed shutdowns with the ENGINEER and OWNER. The work shall be scheduled through the ENGINEER so that the OWNER has a minimum of three working days advance notice.

F. Caps (or plugs) on ductile iron pipe shall be mechanically restrained watertight caps (or plugs) compatible with the pipe being capped and suitable to resist thrusts due to operating pressures.

G. Temporary caps shall be watertight and shall remain in place until the actual interconnections are made.

H. The CONTRACTOR shall submit his detailed procedures for his interconnection sequence to the ENGINEER.

I. If the CONTRACTOR wishes to propose construction of several interconnections at one time, he shall submit a written, detailed proposal to the ENGINEER.

J. No work shall begin on the interconnections until the ENGINEER authorizes the work.

K. Firms performing taps on existing piping shall be acceptable to the OWNER.

L. All joints at interconnections shall be mechanically restrained.

M. New hydrants shall remain bagged in burlap (except for flushing and/or testing) until placed into service.

N. The interconnections and abandonment items include all costs to comply with permits, regulatory agencies, etc., not included under other bid items.

1.3 SCHEMATIC DRAWINGS

A. The schematic drawings included on the plans are not to scale and only indicate the general arrangement of the interconnections and abandonments.

B. In general, heavy lines indicate proposed improvements, pipe, fittings, etc. and light lines indicate existing facilities.

C. The schematic drawings do not show other features (such as other underground utilities, etc.) which could affect the work.

D. The CONTRACTOR shall, at his expense, verify all field conditions.

E. Restrained mechanical joint solid sleeves or restrained flexible sleeve type couplings will be required to connect the proposed pipe to existing pipe, where applicable.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01740

CLEANING

PART 1 GENERAL

1.1 DESCRIPTION

A. Scope:
   1. CONTRACTOR shall execute cleaning during the Project, at completion of the Work, and as required by the General Conditions and this Section.
   2. Maintain in a clean manner the Site, the Work, and areas adjacent to or affected by the Work.

1.2 REFERENCES AND REQUIREMENTS OF REGULATORY AGENCIES

A. Standards referenced in this Section are:
   1. NFPA 241, Safeguarding Construction, Alteration, and Demolition Operations.

B. Requirements of Regulatory Agencies:
   1. In addition to the requirements herein, maintain the cleanliness of the Work and surrounding premises within the Work limits so as to comply with federal, state, and local fire and safety laws, ordinances, codes, and regulations.
   2. Comply with all federal, state, and local anti-pollution laws, ordinances, codes, and regulations when disposing waste materials, debris, and rubbish.

1.3 PROGRESS CLEANING

A. General: Clean the Site, work areas, and other areas occupied by CONTRACTOR at least weekly. Dispose of materials in accordance with the General Conditions and the following:
   1. Comply with NFPA 241 for removing combustible waste materials and debris.
   2. Do not hold non-combustible materials at the Site more than three days if the temperature is expected to rise above 80 degrees F. When temperature is less than 80 degrees F, dispose of non-combustible materials within seven days of their generation.
   3. Provide suitable containers for storage of waste materials and debris.
   4. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately.

B. Site:
   1. Keep outdoor, dust-generating areas wetted down or otherwise control dust emissions.
   2. At least weekly, brush-sweep roadways and paved areas at the Site that are used by construction vehicles or otherwise affected by construction activities.

C. Work Areas:
   1. Clean areas where the Work is in progress to level of cleanliness necessary for proper execution of the Work.
   2. Remove liquid spills promptly and immediately report spills to OWNER, ENGINEER, and authorities having jurisdiction.
   3. Where dust would impair proper execution of the Work, broom-clean or vacuum entire work area, as appropriate.
   4. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

D. Installed Work: Keep installed Work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of material or equipment installed, using only cleaning agents and methods

specifically recommended by material or equipment manufacturer. If manufacturer does not recommend specific cleaning agents or methods, use cleaning agents and methods that are not hazardous to health and property and that will not damage exposed surfaces.

E. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration until Substantial Completion.

F. Cutting and Patching:
   1. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
   2. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

G. Waste Disposal:
   1. Properly dispose of waste materials, surplus materials, debris, and rubbish off the Site.
   2. Do not burn or bury rubbish and waste materials at the Site.
   3. Do not discharge volatile or hazardous substances, such as mineral spirits, oil, or paint thinner, into storm sewers or sanitary sewers.
   4. Do not discharge wastes into surface waters or drainage routes.
   5. CONTRACTOR shall be solely responsible for complying with laws and regulations regarding storing, transporting, and disposing of waste.

H. During handling and installation of materials and equipment, clean and protect construction in progress and adjoining materials and equipment already in place. Apply protective covering where required for protection from damage or deterioration, until Substantial Completion.

I. Clean completed construction as frequently as necessary throughout the construction period.

1.4 CLOSEOUT CLEANING

A. Complete the following prior to requesting inspection for Substantial Completion:
   1. Clean and remove from the Site rubbish, waste material, debris, and other foreign substances.
   2. Sweep paved areas broom-clean. Remove petrochemical spills, stains, and other foreign deposits.
   3. Hose-clean sidewalks and loading areas.
   4. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   5. Leave surface waterways, drainage routes, storm sewers, and gutters open and clean.
   6. Repair pavement, roads, sod, and other areas affected by construction operations and restore to specified condition; if condition is not specified, restore to pre-construction condition.
   7. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of spatter, grease, stains, fingerprints, films, and similar foreign substances.
   8. Clean, wax, and polish wood, vinyl, and painted floors.
   9. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, and similar spaces.
   10. In unoccupied spaces, sweep concrete floors broom-clean.
   11. Clean transparent materials, including mirrors and glazing in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
   12. Remove non-permanent tags and labels.
   13. Touch up and otherwise repair and restore chipped, scratched, dented or otherwise marred surfaces to specified finish and match adjacent surfaces.
       a. Do not paint over “UL” or similar labels, including mechanical and electrical nameplates.
   14. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint, and mortar droppings, and other foreign substances.
   15. Clean plumbing fixtures to sanitary condition, free of stains, including stains resulting from water exposure.

16. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
17. Clean lighting fixtures, lamps, globes, and reflectors to function with full efficiency. Replace temporary lamps provided in permanent fixtures. Replace existing lighting fixture components that are burned out or noticeably dimmed from use during construction. Replace defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
18. Leave the Site clean, and in neat, orderly condition, satisfactory to OWNER and ENGINEER.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01751

STARTING AND PLACING EQUIPMENT IN OPERATION

PART 1 GENERAL

1.1 DESCRIPTION

A. Coordinate schedule for start-up of various equipment and systems. Attend coordination meetings convened by ENGINEER.

B. Notify ENGINEER seven (7) days prior to startup of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage.

D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute startup under supervision of responsible manufacturer's representative and CONTRACTOR's personnel in accordance with manufacturer's instructions.

G. When specified in individual Specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report stating that equipment or system has been properly installed and is functioning correctly.

I. CONTRACTOR shall initially start-up and place all equipment installed into successful operation according to manufacturer's written instructions and as instructed by manufacturer's field representative. CONTRACTOR shall provide all material, labor, tools, equipment, chemicals, lubricants, and expendables required to complete start-up.

J. No system or subsystem shall be started up for continuous operation unless all components of that system or subsystem, including instrumentation, have been tested and proven to be operable as intended by the Contract Documents.

K. General Activities Include:
   1. Cleaning.
   2. Removing temporary protective coatings.
   3. Flushing and replacing greases and lubricants, where required by manufacturer.
   4. Lubrication.
   5. Check shaft and coupling alignments and reset where required.
   6. Check and set motor, pump and other equipment rotation, safety interlocks, and belt tensions.
   7. Check and correct if necessary leveling plates, grout, bearing plates, anchor bolts, fasteners, and alignment of piping which may put stress on pumping equipment connected to it.
   8. All adjustments required.

L. CONTRACTOR shall provide chemicals, lubricants, and all other required operating fluids.

M. CONTRACTOR shall provide fuel, electricity, water, filters, and other expendables required for start-up of equipment, unless otherwise specified.

N. CONTRACTOR shall provide all materials, supplies, labor, etc. to test, demonstrate functionality, and complete polymer feed system. Once approved by Engineer, CONTRACTOR shall remove all liquid from the systems, clean them, and prepare them to receive chemical deliveries.

O. OWNER shall provide sufficient personnel to assist CONTRACTOR in the start-up, but the prime responsibility for proper mechanical operation shall belong to CONTRACTOR. Manufacturer's representatives shall be present during initial start-up and operation, unless otherwise acceptable to ENGINEER.

P. No system, unit process or any piece of equipment shall be started up for continuous operation without the approved Operation and Maintenance Manuals being turned over to OWNER.

Q. Training shall be provided prior to turning the operation of a system, unit process or piece of equipment over to OWNER. Training shall be scheduled for each plant staff work shift accordingly. Training shall conform to the requirements of Section 01821, Instruction of Operations and Maintenance Personnel.

R. OWNER shall assume responsibility for operation of the equipment upon completion of start-up and placing equipment in operation. If the OWNER does not assume operational responsibility and in the opinion of the ENGINEER start-up tasks are completed, the ENGINEER will notify CONTRACTOR, in writing, of the completion of the start-up period.

1.2 MINIMUM START-UP REQUIREMENTS

A. Bearings and Shafting:
1. Inspect for cleanliness, and clean and remove all foreign materials.
2. Verify alignment.
3. Replace defective bearings and those, which run rough or noisy.
4. Grease as necessary and in accord with manufacturer's recommendations.

B. Drives:
1. Adjust tension in V-belt drives, and adjust varipitch sheaves and drives for proper equipment speed.
2. Adjust drives for alignment of sheaves and V-belts.
3. Clean and remove foreign materials before starting operation.

C. Motors:
1. Check each motor for comparison to amperage nameplate value.
2. Correct conditions which produce excessive current flow and exist due to equipment malfunction.

D. Pumps:
1. Check glands and seals for cleanliness and adjustment before running pump.
2. Inspect shaft sleeves for scoring.
3. Inspect mechanical faces, chambers, and seal rings, and replace if defective.
4. Verify that piping system is free of dirt and scale before circulating liquid through the pump.

E. Valves:
1. Inspect both hand and automatic control valves, and clean bonnets and stems.
2. Tighten packing glands to assure no leakage, but permit valve stems to operate without galling.
3. Replace packing in valves to retain maximum adjustment after system is determined to be complete.
4. Replace packing on any valve that continues to leak.
5. Remove and repair bonnets that leak.
6. Coat packing gland threads and valve stems with a surface preparation of "Moly-Cote" or "Fel-Pro" after cleaning.

F. Verify that control valve seats are free from foreign material and are properly positioned for intended service.

G. Tighten flanges and all other pipe joints after system has been placed in operation.
   1. Replace gaskets, which show any sign of leakage after tightening.

H. Inspect all joints for leakage:
   1. Promptly remake each joint that appears to be faulty; do not wait for rust to form.
   2. Clean threads on both parts, and apply compound and remake joints.

I. After system has been placed in operation, clean strainers, drives, pockets, orifices, valve seats and headers in fluid system to assure freedom from foreign materials.

J. Remove rust, scale and foreign materials from equipment and renew defaced surfaces.

K. Set and calibrate draft gages of air filters and other equipment.

L. Inspect fan wheels for clearance and balance.
   1. Provide factory-authorized personnel for adjustment when needed.

M. Check each electrical control circuit to assure that operation complies with these Specifications and requirements and to provide desired performance.

N. Inspect each pressure gage and thermometer for calibration.
   1. Replace items which are defaced, broken, or which read incorrectly.

O. Repair damaged insulation.

P. Vent gasses trapped in any part of systems.
   1. Verify that liquids are drained from all parts of gas or air systems.

1.3 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of Products to Owner's personnel no later than two weeks prior to date of Substantial Completion.

B. Demonstrate Project equipment and Instruct in a classroom environment located at the OWNER's site and instructed by a manufacturer's representative who is knowledgeable about the Project.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

E. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times at designated location.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

G. The amount of time required for instruction on each item of equipment and system is that specified in individual sections or in Section 01620.

1.4 PERFORMANCE TESTING OF MAJOR PROCESS EQUIPMENT

A. After the installation of process equipment the equipment shall be subject to performance tests under actual operating conditions to verify operations.

B. The CONTRACTOR shall notify the ENGINEER and OWNER 7 days prior to the start of performance testing.

C. The test shall be made by the CONTRACTOR and witnessed by a qualified representative of the manufacturer(s), and in the presence of the ENGINEER. The OWNER shall furnish the necessary finished water for the tests.

D. The test shall demonstrate that under the conditions of operation, each unit:
   1. has been properly installed,
   2. has no mechanical defects,
   3. is in proper alignment,
   4. has been properly connected,
   5. is free of overheating of any parts,
   6. is free of all object vibration,
   7. is properly programmed

E. Any defect in the equipment or the installation shall be promptly corrected to provide a fully functional installation, whether by adjustment or replacement of the equipment as necessary. The decision of the ENGINEER as to whether the CONTRACTOR has fulfilled their obligation under the Contract shall be final and conclusive. If the CONTRACTOR fails or refuses to make the required corrections, or if the impaired equipment when tested, shall again fail to perform as specified, the OWNER shall have the option of rejecting the equipment or of accepting the same at reduced payment as may be agreed upon by the parties hereto.

F. Performance Testing Procedures

   1. Performance testing shall be provided as identified in Technical Specifications.

   2. All related electrical, instrumentation, structural equipment and instruments associated with the equipment listed above shall be included in the performance testing.

   3. The period of performance testing shall be 2 weeks.

   4. During performance testing, CONTRACTOR shall obtain baseline operating data on equipment. Baseline data shall include amperage, bearing temperatures, and vibration data obtained. Methods of measurement shall be in accordance with industry standards applicable for the motors being tested.

   5. Performance testing of each piece of equipment shall be successfully completed prior to the CONTRACTOR achieving Substantial Completion. If a major failure occurs, the 2-week performance testing period will be restarted; this determination will solely be made by the ENGINEER and OWNER. Items that may be considered a major failure include, but are not limited to:

      a. Equipment/drives overheating/not operating.
      b. Excessive vibration.
      c. Equipment failure.
      d. Improper operation/sequencing.
      e. Instrumentation failure associated with the equipment.
      f. Anchor bolt failure.

   6. Test Results and Re-testing: The following applies to the entire system tested and to portions thereof:

      a. Successful test results shall indicate conformance in accordance with the Contract Documents.

b. When results of performance testing fail to comply with the Contract Documents regarding such test, CONTRACTOR shall make adjustments and repairs as required and shall repeat the tests as required until conform with the Contract Documents is achieved.

c. Re-testing Because of Disputed Testing Results or Procedures: In the case of an otherwise satisfactory performance test, when there is doubt, dispute, or difference between ENGINEER and CONTRACTOR regarding testing results, methods, or equipment used in performance testing, ENGINEER may order CONTRACTOR to repeat the testing. All costs, including costs of engineering, labor, testing agencies, and inspections, shall be paid by CONTRACTOR.

7. Post-Test Inspection: Once testing has been completed, all machines shall be rechecked for proper alignment and realigned, as required. All equipment shall be checked for loose connections, unusual movement, or other indications of improper operating characteristics. Any deficiencies shall be corrected to the satisfaction of the ENGINEER. All machines or devices, which exhibit unusual or unacceptable operating characteristics, shall be disassembled and inspected. Any defects found during the course of the inspection shall be repaired or the specific part or entire equipment item shall be replaced to the complete satisfaction of the ENGINEER, at no additional cost to the OWNER.

1.5 TESTING, ADJUSTING, AND BALANCING

A. CONTRACTOR shall appoint, employ, and pay for services of an independent firm to perform testing, adjusting and balancing and pay all costs associated with these services.

B. The independent firm will perform services specified in Section 15990.

C. Reports will be submitted in triplicate by the independent firm to the ENGINEER indicating observations and results of tests and indicating compliance or non-compliance with specified requirements and with the requirements of the Contract Documents.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01780

RECORD DOCUMENTS

PART 1 GENERAL

1.1 DESCRIPTION

A. CONTRACTOR shall maintain and provide ENGINEER with record documents per the Specifications, General Conditions, and Supplementary Conditions.

B. Maintenance of Documents:
   1. Maintain in CONTRACTOR'S field office in clean, dry, legible condition complete sets of the following: Drawings, Specifications, Addenda, approved Shop Drawings, Samples, photographs, Change Orders, other modifications of Contract Documents, test records, survey data, Field Orders, and all other documents pertinent to CONTRACTOR'S Work.
   2. Provide files and racks for proper storage and easy access. File in accordance with filing format of Construction Specifications Institute (CSI), unless otherwise approved by ENGINEER.
   3. Make documents available at all times for inspection by ENGINEER and OWNER.
   4. Record documents shall not be used for any other purpose and shall not be removed from the CONTRACTOR'S office without ENGINEER'S approval.
   5. Record Drawings may be reviewed anytime by the ENGINEER and processing of Application may be withheld if documents are not current.

C. Marking System: Provide colored pencils or felt tipped pens for marking changes, revisions, additions and deletions, to the record set of Drawings. Use following color code unless otherwise approved by the ENGINEER:
   1. Process and Mechanical: Red
   2. Architectural: Blue
   3. Structural: Purple
   4. Plumbing: Brown
   5. HVAC: Green
   6. Other Printed Notations: Black

D. Recording:
   1. Label each document "PROJECT RECORD" in 2-inch high printed letters.
   2. Keep record documents current.
   3. Do not permanently conceal any Work until required information has been recorded.
   4. Contract Drawings and Shop Drawings - Legibly mark in ink to show all changes in, or directly associated with, the work of this contract. Keep entire set of drawings current on day-to-day basis. Examples of types of changes which could occur and are to be recorded:
      a. Change in location or elevation of structures.
      b. Change in dimensions of structures.
      c. Elimination of structures.
      d. Unforeseen modifications to existing structures made necessary by work requirements.
      e. Relocation of equipment.
      f. Additions to or expansion of structures.
      g. Changes in mechanical trades components (electrical, heating, ventilating, plumbing).
      h. Measured location of internal utilities or mechanical trade items, which are to be concealed from view, referenced to visible and accessible features of the structure.
      i. Change in location or elevations of underground utilities installed under this Contract (sewer, water, industrial process piping).
      j. Change in materials, such as pipe materials.
      k. Relocation of existing underground utilities made necessary because of interference with work under this contract.

l. Change in topographical contours of finished earth and paved surfaces.
m. Change in elevations of finished surfaces along route of installed underground utilities (sewer, water).

5. Recording Changes for Schematic Layouts
   a. In some cases on the Drawings, arrangements of conduits, circuits, piping, ducts, and similar items is shown schematically and is not intended to portray physical layout. For such cases, final physical arrangement is determined by CONTRACTOR subject to acceptance by ENGINEER.
   b. Record on record documents all revisions to schematics on Drawings, including: piping schematics, ducting schematics, process and instrumentation diagrams, control and circuitry diagrams, electrical one-line diagrams, motor control center layouts, and other schematics when included in the Contract. Record actual locations of equipment, lighting fixtures, in-place grounding system, and other pertinent data.
   c. When plans and sections on the Drawings show the Work schematically, show on the record documents, by dimensions accurate to within one inch in the field, centerline location of items of Work such as conduit, piping, ducts, and similar items.
      1) Clearly identify the Work item by accurate notations such as “cast iron drain,” “rigid electrical conduit,” “copper waterline,” and similar descriptions.
      2) Show by symbol or note the vertical location of Work item; for example, “embedded in slab,” “under slab,” “in ceiling plenum,” “exposed,” and similar designations. For piping not embedded, also provide elevation dimension relative to Project datum.
      3) Descriptions shall be sufficiently detailed to be related to Specifications.
   d. ENGINEER may provide written waiver of requirements relative to schematic layouts shown on plans and sections when, in ENGINEER’s judgment, dimensioned layouts of Work shown schematically will serve no useful purpose. Do not rely on waiver(s) being issued.
6. Supplemental Drawings:
   a. . In some cases, drawings produced during construction by ENGINEER or CONTRACTOR supplement the Drawings and shall be included with record documents submitted by CONTRACTOR. Supplemental record drawings shall include drawings provided with Change Orders, Work Change Directives, and Field Orders and that cannot be incorporated into the Drawings due to space limitations.
   b. . Supplemental drawings provided with record drawings shall be integrated with the Drawings and include necessary cross-references between drawings. Supplemental record drawings shall be on sheets the same size as the Drawings.
   c. . When supplemental drawings developed by CONTRACTOR using computer-aided drafting/design (CADD) software are to be included in record drawings, provide electronic files for such drawings in AutoCAD 2018 format as part of record drawing submittal. Provide electronic files on compact disc or USB drive labeled, “Supplemental Record Drawings,” together with CONTRACTOR name, Project name, and Contract name and number.
7. Specifications and Addenda: Legibly mark up each section to record:
   a. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
   b. Changes made by Change Order or Field Order.
   c. Other matters not originally specified.
8. Submittal:
   a. Upon Substantial Completion of the Work, CONTRACTOR will deliver record documents to ENGINEER. Final payment to the CONTRACTOR will not be made until satisfactory record documents are received and approved by the ENGINEER.
   b. CONTRACTOR shall submit to ENGINEER, accompanied with a transmittal letter, the following:
      1) Date.
      2) Project title and number.
      3) CONTRACTOR’S name and address.
      4) Title and number of each record document.
      5) Certification that each document as submitted is complete and accurate.

6) Signature of CONTRACTOR, or his authorized representative.

E. Affix CONTRACTOR's identification stamp, together with the label "Record Documents," as follows:
   1. On each Contract Drawing, just above the ENGINEER's title block.
   2. On each shop drawing, just above the preparer's title block.
   3. On the front cover or front page of all other documents.

F. Store Record Documents separate from documents used for construction.

G. Record information concurrent with construction progress; make available for periodic examination by ENGINEER.

H. Ensure that entries are complete and accurate, enabling future reference by OWNER.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01781

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 SECTION INCLUDES

A. The CONTRACTOR'S minimum requirements for providing Operation and Maintenance (O&M) Manuals for individual systems covered by the Work, including but not being limited to, valves, pumping equipment, monorail crane system equipment, and related accessories.

B. Definitions:

1. Operation and Maintenance Data:

a. The term "operation and maintenance data" includes all product-related information and documents which are required for operation of all equipment.

b. Required operation and maintenance data includes but is not limited to the following:

1) Complete, detailed written operating instruction for each product or piece of equipment including: equipment function; operating characteristics; limiting conditions; operating instructions for start-up, normal and emergency conditions and regulation and control.

2) Complete, detailed written preventive maintenance instruction as defined below.

3) Recommended spare parts list, sources of supply for parts, and recommended storage provisions for spare parts.

4) Written explanations of all safety considerations relating to operation and maintenance procedures.

5) Name, address and phone number of manufacturer and manufacturer's local service representative.

6) Final approved shop drawings and bill of material

7) Complete electrical drawings including interconnecting wiring and termination diagrams.

8) Manufacturers’ standard catalogue brochures in PDF format.

2. Preventive Maintenance Instructions:

a. Preventative maintenance instructions shall be provided in a stand-alone document separate from the O&M Manual for each piece of equipment furnished. This document shall contain a bulleted list.

b. The term "preventive maintenance instructions" includes all information and instructions required to keep a product or piece of equipment properly lubricated, adjusted and maintained so that the item functions economically throughout its full design life.

c. Preventive maintenance instructions include, but are not limited to, the following:

1) A written explanation with illustrations for each preventive maintenance task.

2) Recommended schedule for execution of preventive maintenance tasks.

3) Trouble shooting instructions.

4) List of required maintenance tools and equipment.

5) Lubrication charts and table of lubricants.

C. Submittals:

1. General: Submit Operations and Maintenance Manual to the ENGINEER within 90 days after approval of Shop Drawings. O&M Manuals shall be submitted in hard copy and in electronic format, and include all O&M data and preventative maintenance instructions as defined herein.

2. Number of Copies:

a. Three (3) hard copies of each item.

b. Two (2) electronic copies of each item (copies of each item on two USB drives).

c. PDFs shall be saved separately for each piece of equipment.

3. Letter of Transmittal: Provide a letter of transmittal with each submittal and include the following in the letter.

a. Date of submittal.

b. Contract title and number.

c. CONTRACTOR's name and address.

d. A list of the attachments and the Specification Sections to which they relate.

e. Reference to or explanation of related submittals already made or to be made at a future date.

4. Format Requirements:

a. The electronic copies of the O&M Manuals shall be furnished in PDF format on a USB drive.

1) Preventative maintenance instructions shall be provided in a stand-alone document separate from the O&M Manual for each piece of equipment furnished. This document shall contain a bulleted list.

b. The hard copies of the O&M Manuals shall be furnished as complete binders for each system. The CONTRACTOR shall supply O&M Manuals for all equipment and materials supplied under this contract.

Each manual shall conform to the following requirements:

1) Use 8-1/2-inch by 11-inch paper of high rag content and quality. Larger drawings or illustrations are acceptable if neatly folded to the specified size in a manner, which will permit easy unfolding without removal from the binder.

2) All text must be legible typewritten or machine printed originals or high quality copies of same.

3) Each page shall have a binding margin of approximately 1½-inches and be punched for placement in a three-ring loose-leaf or triple post binder.

4) Use dividers between major categories of information such as operating instruction, preventive maintenance instructions, or other. When necessary, place each major category in a separate binder.

5) Provide a table of contents for each binder.

6) Identify products by their functional names in the table of contents and at least once in each chapter or section. Thereafter, abbreviations and acronyms may be used if their meaning is explained in a table in the back of each binder. Use of model or catalog numbers or letters for identification is not acceptable.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01783

SPARE PARTS AND MAINTENANCE MATERIALS

PART 1 GENERAL

1.1 DESCRIPTION

A. CONTRACTOR shall furnish spare parts data and maintenance materials for materials and equipment in accordance with the Contract Documents. CONTRACTOR shall prepare and maintain a log of all spare parts delivered. The log shall be organized by specification section and shall include date of parts delivery, itemized record of each part received, location stored, type of container, and any deficiencies or damage observed at delivery. Log shall be turned over to ENGINEER prior to final payment request.

B. List of Spare Parts and Maintenance Materials: With the Shop Drawings and product data for each Specification Section, submit a complete list of spare parts, extra stock materials, maintenance supplies, and special tools required for maintenance ("spare parts and maintenance materials") for two years of operation, with unit prices in current United States funds, and source(s) of supply for each.

C. Packaging and Labeling: Furnish spare parts and maintenance `materials in manufacturer's unopened cartons, boxes, crates, or other original, protective covering suitable for preventing corrosion and deterioration for maximum length of storage normally anticipated by manufacturer. Packaging of spare parts and maintenance materials shall be clearly marked and identified with name of manufacturer, applicable equipment, part number, part description, and part location in the equipment. Protect and package spare parts and maintenance materials for maximum shelf life normally anticipated by manufacturer.

D. Storage Prior to Delivery to OWNER: Prior to furnishing spare parts and maintenance materials to OWNER, store spare parts and maintenance materials in accordance with the Contract Documents and manufacturers' recommendations.

E. Delivery Time and Eligibility for Payment:
   1. Deliver to OWNER spare parts and maintenance materials prior to date of Substantial Completion for equipment or system associated with the spare parts and maintenance materials. Do not deliver spare parts and maintenance materials before commencing start-up for associated equipment or system.
   2. Spare parts and maintenance materials are not eligible for payment until delivered to OWNER and CONTRACTOR's receipt of OWNER's countersignature on letter of transmittal.

F. Procedure for Delivery to Owner: Deliver spare parts and maintenance materials to OWNER's permanent storage rooms at the Site or area(s) at the Site designated by OWNER. When spare parts and maintenance materials are delivered, CONTRACTOR and OWNER will mutually inventory the spare parts and maintenance materials delivered to verify compliance with the Contract Documents regarding quantity and part numbers. Additional procedures for delivering spare parts and maintenance materials to OWNER, if required, will be developed by ENGINEER and complied with by CONTRACTOR.

G. Transfer Documentation:
   1. Furnish on CONTRACTOR letterhead a letter of transmittal for spare parts and maintenance materials furnished under each Specification Section. Letter of transmittal shall accompany spare parts and maintenance materials. Do not furnish letter of transmittal separate from associated spare parts and maintenance materials.
   2. Furnish three original, identical, signed letters of transmittal for each Specification Section. Upon delivery of specified quantities and types of spare parts and maintenance materials to OWNER, designated person from OWNER will countersign each original letter of transmittal indicating OWNER's receipt of spare parts and maintenance materials. OWNER will retain one fully signed original, CONTRACTOR shall submit one fully signed original to ENGINEER, and CONTRACTOR shall retain one fully signed original for CONTRACTOR's file.

3. Letter of transmittal shall include the following:
    a. Information required for letters of transmittal in Section 01331, Shop Drawing Procedures.
    b. Transmittal shall list spare parts and maintenance materials furnished under each Specification Section. List each individual part or product and quantity furnished.
    e. Provide space for countersignature by OWNER as follows: space for signature, space for printed name, and date.

H. CONTRACTOR shall be fully responsible for loss or damage to spare parts and maintenance materials until spare parts and maintenance materials are received by OWNER.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01821

INSTRUCTION OF OPERATIONS AND MAINTENANCE PERSONNEL

PART 1 GENERAL

1.1 DESCRIPTION

A. Scope:
   1. CONTRACTOR shall furnish services of Supplier's operation and maintenance training specialists to instruct OWNER's personnel in recommended operation and maintenance procedures for materials and equipment furnished, in accordance with the Contract Documents.
   2. Supplier shall provide a combination of classroom and field training at the Site, unless otherwise required elsewhere in the Contract Documents.
   3. OWNER reserves the right to record training sessions on video for OWNER's later use in instructing OWNER's personnel.

B. Scheduling of Training Sessions:
   1. General:
      a. CONTRACTOR shall coordinate training services with start-up and initial operation of materials and equipment on days and times, and in manner, acceptable to OWNER, in accordance with the Contract Documents.
      b. Training may be required outside of normal business hours to accommodate schedules of operations and maintenance personnel. Furnish training services at the required days and times at no additional cost to OWNER.
   2. Prerequisites to Training:
      a. Training of OWNER'S personnel shall commence after acceptable preliminary operation and maintenance data has been submitted and work required in Section 01751, Starting and Placing Equipment in Operation.
      b. At option of OWNER or ENGINEER, training may be allowed to take place before, during, or after equipment start-up.
   3. Training Schedule Submittal:
      a. Training Schedule Required: CONTRACTOR shall prepare and submit proposed training schedule for review and acceptance by ENGINEER and OWNER. Proposed training schedule shall show all training required in the Contract Documents, and shall demonstrate compliance with specified training requirements relative to number of hours of training, number of training sessions, and scheduling.
      c. Timing of Training Schedule Submittal: Submit initial training schedule at least 60 days before scheduled start of first training session. Submit final training schedule, incorporating revisions in accordance with ENGINEER's comments, no later than 30 days prior to starting the first training session.
      d. OWNER reserved the right to modify personnel availability for training in accordance with process or emergency needs at the Site.

1.2 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer's instructors shall be factory-trained by manufacturer of material or equipment.

   2. Manufacturer's instructors shall be proficient and experienced in conducting training of type required.

3. Qualifications of instructors are subject to acceptance by ENGINEER. If ENGINEER does not accept qualifications of proposed instructor, furnish services of replacement instructor with acceptable qualifications. CONTRACTOR shall submit instructor qualifications such that Final Acceptance by the ENGINEER shall be no later than 30 days prior to starting the associated training.

B. Training Scheduling Conference:
   1. Prior to preparing initial training schedule submittal, schedule and hold training scheduling conference at the location where progress meetings are held, to review:
      a. Training requirements in accordance with the Contract Documents.
      b. Work to be completed prior to starting training.
      c. Work progress and Progress Schedule relative to start-up and training.
      d. Scheduling constraints for OWNER's personnel, relative to days and times of training sessions.
      e. Preferred days for training.
      f. Location where training will be performed and facilities available.
      g. Required submittals relative to training.
      h. Other issues relative to training of operations and maintenance personnel.
      i. New York State Department of Health (NYSDOH) requirements for obtaining continuing education credits for Water Treatment Plant Operators for the training sessions.
   2. Attendance is mandatory for the following:
      a. CONTRACTOR's project manager.
      b. CONTRACTOR's Site superintendent.
      c. Project manager of Subcontractors responsible for providing materials and equipment for which training of operations and maintenance personnel is required.
      d. Manufacturers and other Suppliers invited by CONTRACTOR.
      f. ENGINEER.
      g. OWNER's staff responsible for training coordination, and staff responsible for scheduling operations and maintenance personnel.
   3. If additional information must be developed to adequately cover agenda items, reconvene conference as soon as possible.
   4. CONTRACTOR shall prepare minutes summarizing the discussions of conference, decisions made, and agreements and disagreements, and submit the minutes to each conference attendee.

1.3 SUBMITTALS

A. CONTRACTOR shall coordinate submittals with the ENGINEER and OWNER in order to obtain NYSDOH continuing education units (CEUs) for Water Treatment Plant Operators for the training sessions. Contract shall comply with the requirements of the NYSDOH.

B. Action Submittals: Submit the following:
   1. Training Schedule: Detailed schedule of training sessions, demonstrating compliance with number of training sessions, hours required in the Contract Documents, and complying with the Contract Times. Training schedules shall include start and end times, and if any breaks will be scheduled. Submit training schedule submittals in accordance with time frames specified in this Section.

C. Informational Submittals: Submit the following:
   1. PowerPoint Presentation, where applicable.
   2. Lesson Plan: Acceptable lesson plan for training on each material or equipment item, in accordance with the Schedule of Equipment Testing and Manufacturer's Services in Section 01620 and the Contract Documents. Lesson plan shall comply with requirements of this Section. Include with lesson plan copy of handouts that will be used during training sessions. Provide lesson plan submittals in accordance with time frames specified in this Section.

3. Qualifications: Credentials of manufacturer's proposed operations and maintenance instructor(s). Credentials shall demonstrate compliance with requirements of this Section and shall include brief resume' and specific details of instructor's operating, maintenance, and training experience relative to the specific material and equipment for which instructor will provide training.
4. Minutes of training scheduling conference.

D. Closeout Submittals: Submit the following:
1. Trainee sign-in sheet for each training session. Submit to OWNER's training coordinator.

1.4 LESSON PLAN

A. Supplier's lesson plan shall describe specific instruction topics, system components for which training will be furnished, and training procedures. Handouts, if any, to be used in training shall be included with the lesson plan. Describe in lesson plan "hands-on" demonstrations planned for training sessions.

B. Submit acceptable lesson plan 30 days prior to starting associated training.

C. Lesson plan shall include estimated duration of each training segment.

D. Lesson plan shall include the following:
1. Equipment Overview (required for all types of operations and maintenance training):
   a. Describe equipment's operating (process) function and performance objectives.
   b. Describe equipment's fundamental operating principles and dynamics.
   c. Identify equipment's mechanical, electrical, and electronic components and features. Group related components into subsystems and describe function of subsystem and subsystem's interaction with other subsystems.
   d. Identify all support equipment associated with operation of subject equipment, such as air intake filters, valve actuators, motors, and other appurtenant items and equipment.
   e. Identify and describe safety precautions and potential hazards related to operation.
   f. Identify and describe in detail safety and control interlocks.
2. Equipment Operation:
   a. Describe operating principles and practices.
   b. Describe routine operating, start-up, and shutdown procedures.
   c. Describe abnormal or emergency start-up, operating, and shutdown procedures that may apply.
   d. Describe alarm conditions and responses to alarms.
   e. Describe routine monitoring and recordkeeping procedures.
   f. Describe recommended housekeeping procedures.
3. Equipment Preventive Maintenance:
   a. Describe preventative maintenance inspection procedures required to:
      1) Inspect equipment in operation.
      2) Identify potential trouble symptoms and anticipate breakdowns.
      3) Forecast maintenance requirements (predictive maintenance).
   b. Define recommended preventative maintenance intervals for each component.
   c. Describe lubricant and replacement part recommendations and limitations.
   d. Describe appropriate cleaning practices and recommend intervals.
   e. Identify and describe use of special tools required for maintenance of equipment.
   f. Describe component removal, installation, and disassembly and assembly procedures.
   g. Perform "hands-on" demonstrations of preventive maintenance procedures.
   h. Describe recommended measuring instruments and procedures, and provide instruction on interpreting alignment measurements, as appropriate.
   i. Define recommended torquing, mounting, calibrating, and aligning procedures and settings, as appropriate.
   j. Describe recommended procedures to check and test equipment following corrective maintenance.

4. Troubleshooting:
    a. Describe how to determine if corrective maintenance or an operating parameter adjustment is required.
    b. Define recommended systematic troubleshooting procedures.
    c. Provide component-specific troubleshooting checklists.
    d. Describe applicable equipment testing and diagnostic procedures to facilitate troubleshooting.
    e. Describe common corrective maintenance procedures with “hands on” demonstrations.

1.5 TRAINING AIDS

A. Manufacturer’s instructor shall incorporate training aids as appropriate to assist in the instruction. Provide handouts of text, tables, graphs, and illustrations as required. Other appropriate training aids include:
    1. Audio-visual aids, such as videos, Microsoft PowerPoint presentations, overhead transparencies, posters, drawings, diagrams, catalog sheets, or other items.
    2. Equipment cutaways and samples, such as spare parts and damaged equipment.
    3. Tools, such as repair tools, customized tools, and measuring and calibrating instruments.

B. Handouts:
    1. Manufacturer’s instructor shall distribute and use descriptive handouts during training. Customized handouts developed especially for training for the Project are encouraged.
    2. Photocopied handouts shall be good quality and completely legible.
    3. Handouts should be coordinated with the instruction, with frequent references made to the handouts.
    4. Provide one set of handouts for each trainee expected at each training session.

C. Audio-visual Equipment: Training provider shall provide audio-visual equipment required for training sessions. If suitable equipment is available at the Site, OWNER may make available OWNER’s audio-visual equipment; however, do not count on OWNER providing audio-visual equipment. Audio-visual equipment that training provider shall provide, as required, includes:
    1. Laptop computer, presentation software, and suitable projector.
    2. As required, extension cords and spare bulb for projector.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 TRAINING DELIVERY

A. General:
    1. Instructors shall be fully prepared for the training sessions. Training delivery shall be communicative, clear, and proceed according to lesson plan accepted by ENGINEER, with lesson content appropriate for trainees. If OWNER or ENGINEER deems that training delivery does not to comply with the Contract Documents, training shall be postponed, rescheduled, and re-performed in acceptable manner at no additional cost to OWNER.
    2. Trainee Sign-in Sheets: In format acceptable to OWNER, furnish sign-in sheet for trainees for each session. Sign-in sheets shall include the Project name, equipment or system for which training was provided, and type of training (e.g., operations, mechanical maintenance, instrumentation/controls maintenance, or other), and name of each trainee. Upon completion of training, submit copy of each sign-in sheet to OWNER’s training coordinator.

B. “Hands-on” Demonstrations:
    1. Manufacturer’s instructor shall present “hands-on” demonstrations of operations and maintenance of equipment for each training session, in accordance with lesson plan accepted by ENGINEER.

2. CONTRACTOR and manufacturer shall furnish tools necessary for demonstrations.

3.2 TRAINING SCHEDULE

A. Manufacturer shall furnish, at minimum, total hours of training indicated in the Schedule of Equipment Testing and Manufacturer's Services in Section 01620. Travel time and expenses are responsibility of manufacturer and are excluded from required training time indicated in the Contract Documents.

B. Shifts and Training Sessions Required:
   1. OWNER's operations take place 24 hours per day, divided into 1 day shift for electrical and maintenance personnel and 2 shifts (morning and afternoon) for operations personnel.

   2. Training Sessions:
      a. Maximum training per day is four hours; sessions longer than four hours shall be spread over multiple, preferably consecutive, days. Provide identical training sessions as follows:
         1) One session during morning shift.
         2) One session during afternoon shift.

END OF SECTION

SECTION 02050

DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Demolition of existing facilities.

B. Removal of designated construction.

C. Disposal of materials.

1.2 RELATED SECTIONS

A. Section 01311 - Coordination with Owner's Operations.

B. Section 02137 – Lead Paint Removal.

C. Section 13280 – Asbestos Abatement and Removal.

1.3 SUBMITTALS FOR REVIEW

A. Submit in accordance with the Special Conditions of these Contract Documents.

B. Demolition Methods:

1. Submit for approval proposed means, methods, equipment, and operating sequences to be utilized for demolition. Include coordination for possible shut-off, capping, temporary services, continuation of utility services, and other applicable items to ensure no interruption of the operations of the OWNER.

C. Notification:

1. At least ten (10) business days prior to commencement of demolition, notify ENGINEER in writing of the proposed schedule. Do not commence demolition without the written permission of the ENGINEER.

1.4 REGULATORY REQUIREMENTS

A. Conform to all applicable federal, state, and local laws and codes for demolition Work, dust control, and products requiring electrical power removal.

B. Obtain any required permits, as necessary.

C. Do not close or obstruct egress width to any building or Site exit.

D. Do not disable or disrupt building fire or life safety systems without giving five (5) days prior written notice to the OWNER and OPERATOR.

E. Conform to procedures applicable when hazardous or contaminated materials are discovered.

1.5 SEQUENCING

A. Sequence activities as described in Section 01010 - Summary of Work and Section 01311 – Coordination with Owner's Operations.

1.6 SCHEDULING

A. Schedule demolition Work to coincide with new construction.

B. The CONTRACTOR shall coordinate the demolition Work with the OWNER.

C. Carry out operations so as to avoid interference with operations and work in and near adjacent facilities.

D. No shutdown of any kind shall occur without the written consent of the OWNER.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PREPARATION

A. Provide, erect, and maintain temporary barriers and bulkheads, and security devices in accordance with this Specification.

B. Protect existing materials, which are not to be demolished.

C. Prevent any movement of structures; provide bracing and shoring. The CONTRACTOR shall take care to prevent any unexpected collapse of existing structures.

D. Notify affected utility companies before starting Work and comply with their requirements.

E. Mark the location and termination of all utilities.

F. Provide appropriate temporary signage including signage for job site exit or egress.

3.2 GENERAL

A. Disconnect, remove, cap, and identify designated utilities in demolition areas.

B. Demolish in an orderly and careful manner. Protect existing remaining structures, piping, valves, etc. from the demolition Work.

C. No materials shall be burned on Site.

D. The use of explosives for demolition shall not be allowed.

E. Conduct operations with minimum interference to Site access.

F. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon, or limit access to their property.

G. Incorporate provisions for sedimentation control during and after demolition, if applicable.

H. Perform all demolition and removal Work to prevent damage or injury to adjacent structures, occupants thereof, and features which might result from falling debris or other causes and so as not to interfere with the use and free and safe passage to and from adjacent structures.

I. Closing or obstructing of public roadways, sidewalks, and passageways adjacent to the Work by the placement or storage of materials shall not be permitted and all operations shall be conducted with a minimum interference to vehicular and/or pedestrian traffic on these ways.

J. Erect and maintain barriers, lights, sidewalk sheds, and other necessary protective devices when applicable.

K. Repair damage to facilities to remain or to any property belonging to the OWNER, or occupants of adjacent facilities.

L. Perform all Asbestos and Lead abatement in accordance with all Federal, State, and Local regulations as listed in Section 02137 Lead Paint Removal and Section 13280 Asbestos Abatement and Removal.

3.3 POLLUTION CONTROLS

A. Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with governing regulations pertaining to environmental protection.

1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, or pollution.

2. Clean adjacent structures, facilities, and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to conditions existing prior to the start of Work.

3.4 STRUCTURAL REMOVAL

A. Remove structures to the lines and grades indicated on the Contract Drawings. The removal of structures beyond those indicated limits shall be at the expense of the CONTRACTOR. Excess removal shall be reconstructed to the satisfaction of the ENGINEER, with no additional compensation to the CONTRACTOR.

B. All concrete, brick, tile, concrete block, stone walls, damaged roof decking, reinforcement, structural or miscellaneous metals, plaster, wire mesh, and other items contained in or upon the structure shall be removed and taken from the Site, unless otherwise approved by the ENGINEER.

C. The surfaces of walls, floors, ceilings, or other areas that are exposed by any of the removals specified, indicated, or required and which will remain within the active flow stream shall be repaired and re-finished, watertight, by the CONTRACTOR. Utilize the same or matching materials as the existing adjacent surface or as otherwise approved by the ENGINEER.

D. If partial demolition of underground structures is indicated on the Contract Drawings, once removal of the designated foundation, wall, slabs, or structure is complete, the CONTRACTOR shall abandon-in-place the remaining portion and neatly backfill and grade the area. No structural steel and/or concrete structures shall remain exposed above grade.

3.5 MECHANICAL AND PIPING REMOVAL

A. Mechanical removal shall consist of dismantling and removing of existing piping, valves, pumps, motors, equipment, and other appurtenances, such as gauges, instrument tubing, etc., as specified, indicated on the Contract Drawings, or required for the completion of the Work. It shall include cutting, capping, and plugging as required.

B. Existing process, water, chemical, gas, fuel oil, and other piping shall be removed where required, indicated, and specified. Chemical and fuel lines and tanks shall be purged and made safe prior to removal or capping. Where piping that is to be removed passes through existing walls that shall remain, the pipe shall be cut off and properly capped on each side of the wall.

C. Waste and vent piping shall be removed to points shown. Pipe shall be plugged with cleanouts and plugs. Where vent stacks pass through an existing roof that is to remain, they shall be removed and the hole in the roof properly patched and made watertight; new roof material shall be identical (or as close as practical) to the existing roofing materials unless otherwise directed by the ENGINEER.

3.6 ELECTRICAL AND INSTRUMENTATION REMOVAL

A. Electrical removal shall consist of the demolition of existing panelboards, motor control centers, control panels, motors, conduits and wires, poles and overhead wiring, exposed ground conductors, lighting fixtures, miscellaneous electrical devices, and all instrumentation as indicated, specified, or required to perform the Work.

B. The CONTRACTOR shall verify the function of all wiring prior to disconnecting and removing it. Ducts that are not to be reused shall be plugged where they enter buildings and made watertight.

C. All existing electrical equipment to be demolished shall be removed with such care as may be required to prevent unnecessary damage to remaining equipment and/or structures and to maintain OWNER/OPERATOR operations. Any damage incurred shall be repaired.

D. Motors shall be disconnected and removed where required, indicated, or specified. Motors not designated by the OWNER to be salvaged shall be removed from the site and disposed of by the CONTRACTOR.

E. Conduits and wires shall be abandoned in-place or removed where required, indicated, or specified. Abandoned conduits concealed in floor or ceiling slabs or in walls shall be cut flush with the slab or wall at the point of entrance. The conduits shall be suitably plugged and the area repaired in a flush, smooth, approved manner. Exposed conduits and their supports shall be disassembled and removed from the site. Repair all areas of Work to prevent rust spots on exposed surfaces.

3.7 REFUSE REMOVAL, HANDLING, AND OWNERSHIP

A. Any item that is to remain the property of the OWNER/OPERATOR shall be carefully removed, so as not to be damaged as a result of the Work by the CONTRACTOR and shall be placed in an OPERATOR-designated, protected, and secure location within the Site.

1. If an item is to be retained by the OWNER/OPERATOR and stored off-Site, it shall be so noted on the Contract Drawings or these Specifications. The CONTRACTOR shall include the costs associated with loading, securing, transporting, and unloading.

B. Remove materials as the Work progresses. Upon completion of the Work, leave areas in a clean condition. All demolished materials shall be removed from the Site without delay.

C. All materials, equipment, and debris shall be transported and disposed of in an appropriate manner at the expense of the CONTRACTOR and in compliance with all existing and governing laws and regulations.

3.8 ALTERATIONS AND CLOSINGS

A. Alterations shall conform to all applicable Specifications, the Contract Drawings, and the directions and approvals of the ENGINEER.

B. Where alterations require cutting or drilling into existing floors, walls, and roofs, the holes shall be repaired in an approved manner. The CONTRACTOR shall repair such openings with the same or matching materials as the existing floor, wall, or roof or as otherwise approved by the ENGINEER. All repairs shall be smoothly finished unless otherwise approved by the ENGINEER.

C. Openings in existing concrete slabs, ceilings, masonry walls, floors, and partitions shall be closed and sealed as indicated or otherwise directed by the ENGINEER. New Work shall be keyed into the existing Work in an acceptable manner. New reinforcing steel shall be welded to the existing reinforcing steel. Welding shall conform to AWS D12.1, Reinforcing Steel Welding Code. In general, use the same or matching materials as the existing adjacent surface. The finished closure shall be a smooth, tight, sealed, permanent closure acceptable to the ENGINEER.

3.9 CLEAN-UP

A. Remove all temporary structures, barriers, and security devices upon completion of the Work.

B. The CONTRACTOR shall remove from the Site all debris resulting from the demolition operations as it accumulates. Upon completion of the Work, all materials, equipment, waste, and debris of every sort shall be removed and premises shall be left, clean, neat, and orderly.

END OF SECTION

SECTION 02100

CLEARING

PART 1 GENERAL

1.1 DESCRIPTION

A. Scope

1. CONTRACTOR shall furnish all labor, materials, equipment, and incidentals required to perform all clearing and grubbing as shown, specified, and otherwise required to complete the Work.

B. Coordination: Coordinate the Work under this Section with applicable Work outlined in other Sections of the Specifications.

C. Related Work Specified Elsewhere:

1. Section 02351 – Excavation, Backfill, and Trenching.

2. Section 02900 – Restoration.

1.2 QUALITY ASSURANCE

A. Codes and Standards: State and local laws and code requirements shall govern the hauling and disposal of trees, shrubs, stumps, roots, rubbish, debris and other matter.

1.3 JOB CONDITIONS

A. Protection:

1. Streets, roads, adjacent property and other works and structures shall be protected throughout the entire Project. CONTRACTOR shall return to original condition, satisfactory to the ENGINEER, damaged facilities caused by the CONTRACTOR's operations.

2. Trees, shrubs and grassed areas which are to remain shall be protected by fences, barricades, wrapping or other methods as shown, specified or approved by the ENGINEER. Equipment, stockpiles, etc. shall not be permitted within tree branch spread. Trees shall not be removed without approval of the ENGINEER unless shown or specified.

1.4 GUARANTEE

A. CONTRACTOR shall guarantee that Work performed under this Section will not permanently damage trees, shrubs, turf or plants designated to remain, or other adjacent work or facilities. If damage resulting from CONTRACTOR's operations appears during the period up to 24 months after completion of the Project, he shall replace damaged items at no expense to OWNER.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 CLEARING AND GRUBBING

A. Prior to execution of the work under this Section, the CONTRACTOR and the ENGINEER will examine the Site and agree upon the extent of clearing and grubbing required.

1. In areas requiring extensive clearing and grubbing, agreement shall be on limits of the work. These limits shall not exceed the limits of the temporary and/or permanent easements shown on the Contract Drawings and shall be the minimum required for construction. Damage outside these limits caused by the CONTRACTOR's operations shall be corrected at the CONTRACTOR's expense.

B. Except as noted below, CONTRACTOR shall remove from the Site and satisfactorily dispose of all trees, shrubs, stumps, roots, brush, masonry, rubbish, scrap, debris, pavement, curbs, fences and miscellaneous other structures not covered under other sections as shown, specified or otherwise required to permit construction of the new Work.

C. Trees, stumps and other cleared and grubbed material shall be disposed of off Site. No cleared or grubbed material may be used in backfills or structural embankments.

D. Burning on Site shall not be done unless approved by authorities having jurisdiction.

E. All burning, on or off the Site, shall be in complete accordance with rules and regulations of local authorities having jurisdiction.

F. Trees and shrubs shall be trimmed to avoid removal or damage to them. Trimmed or damaged trees shall be treated and repaired by persons with experience in this specialty who are approved by ENGINEER. Trees and shrubs intended to remain, which are damaged beyond repair or removed, shall be replaced by the CONTRACTOR at his expense.

G. Control air pollution caused by dust and dirt, and comply with governing regulations.

3.2 TOPSOIL REMOVAL

A. Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4 inches. Topsoil shall be substantially free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.

B. Strip topsoil, which is satisfactory to whatever depths are encountered, and in such manner as to prevent intermingling with the underlying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping.

1. Where trees are shown or directed to be left standing, stop topsoil stripping a sufficient distance from such trees to prevent damage to the main root system.

C. Stockpile topsoil in storage piles in areas shown, or where otherwise approved by ENGINEER. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent windblown dust. Topsoil in excess of quantity required shall remain property of OWNER.

END OF SECTION

SECTION 02112

PAVEMENT CUTTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pavement cutting.

B. Pavement scoring.

C. Pavement (concrete) breaking.

D. Pavement grinding.

E. Pavement removal and disposal.

1.2 REFERENCES

A. NYSDOT - Manual of Uniform Traffic Control Devices.

1.3 RELATED SECTIONS

A. Section 01562 - Protection of Work and Property.

B. Section 01563 - Temporary Controls.

C. Section 02100 - Site Clearing.

C. Section 02351 - Excavation, Backfill and Trenching.

E. Section 02900 – Restoration.

1.4 REGULATORY REQUIREMENTS

A. Coordinate pavement cutting with utility companies.

B. Conform to applicable local, state, and county codes for legal disposal of pavement materials.

C. Refer to Section 02100 for requirements of disposal of surplus material.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PREPARATION

A. Notify local officials, Fire and Police Departments of streets to be blocked off, detours or restrictions to maintaining of traffic on a daily basis.

B. A site-specific traffic plan shall be submitted to all local officials for notification and approval a minimum of 48 hours prior to any extensive detours or traffic restrictions that will be implemented for an extended period of time.

C. Set up barricades, warning signs and traffic direction information prior to start of pavement cutting.

D. Provide flagmen to direct traffic.

3.2 PAVEMENT CUTTING AND BREAKING

A. Pavements covering those areas to be excavated shall be broken up, removed, and then disposed of in accordance with Article 1.04. All paved areas shall be first cut or scored continuously along a straight line, parallel to and on each side of the centerline of the trench or excavation, at a width sufficient for the trench excavation or structure excavation.

B. Pavement cuts in concrete pavement or pavement with a concrete base shall be made by scoring or cutting the concrete with a concrete saw. The depth of the saw cut shall be to the full depth of the concrete pavement thickness. Before excavation, the concrete pavement shall then be broken up with hand operated, pneumatic paving breakers, or mechanical drop hammers designed for such purpose, providing they may be used without endangering existing utilities or causing undesirable vibrations. “Headache balls” will not be permitted for breaking up concrete pavement.

C. Pavements cuts in blacktop pavement shall be made by scoring or cutting the pavement with a concrete saw, wheel cutter, pneumatic paving breaker or drop hammer type pavement cutter. The pavement cut must be continuous, and made for the full depth of the pavement.

D. Pavement cuts for final pavement replacement shall be made as outlined above. Pavement cuts shall be made parallel to the centerline of the trench shall be located at a minimum of 12 inches outside the backfilled trench on undisturbed subgrade and shall be in a straight line for minimum length of 100 feet between manholes or between those stations where changes in direction of the installed piping were made. Where a full street width overlay is to be installed, the cutbacks may follow the backfilled trench alignment. Loose, torn, cut, marked up or damaged pavement outside the cutback areas shall be removed and replaced at the CONTRACTOR’s expense and match the proposed permanent paving.

E. Pavement cuts in driveways shall be made in a straight alignment perpendicular or parallel to the driveway and for its full width.

F. Pavement cuts in parking areas shall be made in a straight alignment parallel to the centerline of trench.

3.3 PAVEMENT GRINDING

A. Where shown on the Contract Drawings, the CONTRACTOR shall remove a portion of an existing pavement including Portland cement concrete pavement, asphalt Portland cement concrete pavement base course, to the limits and profile specified by grinding, milling, or planing methods. This process shall yield a base upon which a final pavement course will be applied. The contractor shall employ equipment especially designed and manufactured for the grinding, milling or planing of pavements.

B. The resulting ground, milled or planned surfaced shall be thoroughly cleaned and free from dust, loose pavement material or other material. The surface shall be free from gouges, large cracks and unsound, soft or broken-up areas. Gouges from lack of proper control of the grinding, milling or planing machine shall be made level and true by the use of a trueing and leveling course of asphalt concrete if allowed by the ENGINEER. Cracks greater than 1/4 inch shall be cleaned and filled in accordance with NYSDOT Specification 633.302. Unsound, soft or broken-up areas shall be excavated and repaired in accordance with Section 02900.

C. CONTRACTOR shall dispose of all asphalt concrete removed by grinding.

END OF SECTION

SECTION 02137

LEAD PAINT REMOVAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section defines the minimum requirements for lead paint removal to be completed as part of the demolition operations included in this Contact.

1.2 RELATED SECTIONS

A. Special Project Conditions

B. Section 02030 - Demolition

C. Section 09900 - Painting

1.3 REFERENCES

A. Lead Survey included in Appendix D- Asbestos and Lead Report, Prepared by Sienna Environmental Technologies.

B. Standards

1. The CONTRACTOR shall comply with the applicable provisions and recommendations of the following. If a contradiction exists between existing codes or this Specification, the more stringent shall apply.

a. Code of Federal Regulations (CFR):

1. 29 CFR Part 1910, "Occupational Safety and Health Standards."

2. 29 CFR Part 1926, "Safety and Health Regulations for Construction."

3. 40 CFR Part 260, "Hazardous Waste Management System: General."

4. 40 CFR Part 261, "Identification and Listing of Hazardous Waste."

5. 40CFR Part 262, "Standards Applicable to Generators of Hazardous Waste."

6. 40 CFR Part 263, "Standards Applicable to Transporters of Hazardous Waste."

7. 40 CFR Part 264, "Standards for Owners and Operations of Hazardous Waste Treatment, Storage, and Disposal Facilities."

8. 40 CFR Part 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities."

9. 40 CFR Part 268, "Land Disposal Restrictions."

10. 49 CFR Part 172, "Hazardous Material Table, Special Provisions, Hazardous Material Communications, Emergency Response Information, and Training Requirements."

b. National Institute for Occupational Safety and Health (NIOSH) Occupational Safety and Health Association (OSHA) Booklet 3142, "Lead in Construction."

c. Inorganic Lead Guidance Document, American Industrial Hygiene Association, Fairfax, VA, 1995.

d. Steel Structures Painting Council Guide 6 – Guide for coating debris generated during paint removal operations.

1.4 QUALITY ASSURANCE

A. Before exposure to lead-contaminated dust, provide workers with a comprehensive medical examination as required by 29 CFR 1926.62. The examination shall not be required if adequate records show that employees have been examined as required by 29 CFR 1926.62 within the last year.

B. Medical Records: Maintain complete and accurate medical records of employees in accordance with 29 CFR 1910.20.

C. The Contractor shall employ a Certified Industrial Hygienist (CIH) who will be responsible for the following:

1. Certify Training.

2. Review and approve lead-containing paint removal plan for conformance to the applicable referenced standards.

3. Inspect lead-containing paint removal work for conformance with the approved plan.

4. Direct monitoring.

5. Confirm work is performed in strict accordance with specifications.

6. Confirm hazardous exposure to personnel and to the environment are adequately controlled throughout the project.

D. Train each employee performing paint removal, disposal, and air sampling operations prior to the time of initial job assignment, in accordance with 29 CFR 1926.62.

E. Establish and implement a respiratory protection program as required by 29 CFR 1910, 29 CFR 1910, 29 CFR 1926.62.

F. Hazard Communication Program: Establish and implement a Hazard Communication Program as required by 29 CFR 1910.

G. Hazardous Waste Management: The Hazardous Waste Management plan shall comply with applicable requirements of federal, state, and local hazardous waste regulations.

H. Conduct a pre-construction conference to discuss in detail the lead-containing paint removal work plan, including work procedures and precautions for the work plan.

1.5 SUBMITTALS

A. Lead Paint Removal Plans: Prior to mobilization to Site, submit lead paint removal plans to ENGINEER for review to ascertain compliance with the requirements specified. The plans shall include written procedures, and schedules, and CONTRACTOR drawings, as applicable, to address areas requiring lead paint removal as identified in the lead survey. The CONTRACTOR drawings shall illustrate the location of the lead pain abatement area on site plan. Include anticipated health and safety procedures required for safe removal, storage, and disposal.

B. Statements Certifications and Statements:

1. Qualifications of CIH: Submit name, address, and telephone number of the CIH selected to perform responsibilities in paragraph entitled "CIH Responsibilities." Submit proper documentation that the Industrial Hygienist is certified by the American Board of Industrial Hygiene in comprehensive practice, including certification number and date of certification.

2. Testing Laboratory: Submit the name, address, and telephone number of the testing laboratory selected to perform the monitoring, testing, and reporting of airborne concentrations of lead.

C. Field Test Reports: Monitoring Results: Submit monitoring results to the Contracting Officer within 3 working days, signed by the testing laboratory employee performing the air monitoring, the employee that analyzed the sample, and the CIH.

D. Progress Submittals. Review with ENGINEER, on a weekly basis, documented progress of lead paint removal. Progress should be documented on contract drawings on a daily basis. Submit documentation to ENGINEER upon completion of lead paint removal activities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify items listed in lead survey by Sienna Environmental Technologies.

B. Verify that the site is ready to receive work.

C. Notify the ENGINEER seven days prior to the start of any paint removal work.

D. Examine each area prior to initiation of work to determine proper exclusion zones and the amount of general refuse to be removed prior to lead paint removal.

E. Verify that the accumulation area and/or temporary storage area is prepared to receive the anticipated waste generated prior to disposal.

3.2 PREPARATION

A. Establish work zones and install dust barriers. Dust barriers will include the following:

1. Six mil plastic sheeting barriers in doorways, windows, and all other openings in each area.

2. Produce negative pressure on the work area using high-efficiency particulate air (HEPA) filters.

B. Place 6 mil plastic sheeting across all floors beneath walls and ceilings requiring lead paint removal such that all lead debris will be captured. Overlap all layers of plastic sheeting by a minimum of one foot and secure seam with adhesive tape.

C. Establish a decontamination area outside of the exclusion zone.

D. Remove all miscellaneous trash and general debris from inside the exclusion zone prior to lead paint abatement activities to prevent contamination with lead paint.

E. Prior to abatement, wipe down all equipment with tack cloth that requires removal prior to lead abatement.

F. Perform paint removal work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition.

G. Shut down, lock out, and isolate Heating, Ventilating and Air Conditioning (HVAC) systems that supply, exhaust, or pass through the lead control areas. Seal intake and exhaust vents in the lead control area with 6-mil plastic sheet and tape. Seal seams in HVAC components that pass through the lead control area.

H. Provide clean change rooms facilities within the physical boundary around the designated lead control area in accordance with requirements of 29 CFR 1926.62.

I. Mechanical Ventilation System:

1. Use adequate ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.57.

2. To the extent feasible, use fixed local exhaust ventilation connected to HEPA filters or other collection systems, approved by the industrial hygienist. Local exhaust ventilation systems shall be designed, constructed, installed, and maintained in accordance with American National Standards Institute (ANSI) Z9.2.

3. If air from exhaust ventilation is recirculated into the work place, the system shall have a high efficiency filter with reliable back-up filter and controls to monitor the concentration of lead in the return air and to bypass the recirculation system automatically if it fails. Air may be recirculated only where exhaust to the outside is not feasible.

J. Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been given appropriate training and protective equipment.

K. Warning Signs: Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.

3.3 WORK PROCEDURES

A. Perform removal of lead-containing paint in accordance with approved lead-containing paint removal plan. Use procedures and equipment required to limit occupational and environmental exposure to lead when lead- containing paint is removed in accordance with 29 CFR 1926.62. Dispose of removed paint

chips and associated waste in compliance with Environmental Protection Agency (EPA), federal, state, and local requirements.

B. Personnel Exiting Procedures:

1. Whenever personnel exit the lead-controlled area, they shall perform the following procedures and shall not leave the work place wearing any clothing or equipment worn during the work day:

a. Vacuum themselves off.

b. Remove protective clothing in the decontamination room, and place them in an approved impermeable disposal bag.

c. Change to clean clothes prior to leaving the physical boundary designated around the lead-contaminated job site.

C. Air Monitoring: Monitoring of airborne concentrations of lead shall be in accordance with 29 CFR 1910.1025 and as specified herein. Air monitoring, testing, and reporting shall be performed by a CIH or an Industrial Hygiene (IH) Technician who is under the direction of the CIH:

1. The CIH or the IH Technician under the direction of the CIH shall be on the job site directing the monitoring, and inspecting the lead-containing paint removal work to ensure that the requirements of the Contract have been satisfied during the entire lead-containing paint removal operation.

2. Submit results of air monitoring samples, signed by the CIH, within 24 hours after the air samples are taken. Notify the ENGINEER immediately of exposure to lead at or in excess of the action level of 30 micrograms per cubic meter of air outside of the lead control area.

D. Additional monitoring activities shall include:

1. Perform personal and area monitoring during the entire paint removal operation. Sufficient area monitoring shall be conducted at the physical boundary to ensure unprotected personnel are not exposed above 30 micrograms per cubic meter of air at all times. If the outside boundary lead levels are at or exceed 30 micrograms per cubic meter of air, work shall be stopped and the CIH shall immediately correct the condition(s) causing the increased levels and notify the Contracting Officer immediately. The CIH shall review the sampling data collected on that day to determine if condition(s) requires any further change in work methods. Removal work shall resume when approval is given by the CIH. The CONTRACTOR shall control the lead level outside of the work boundary to less than 30 micrograms per cubic meter of air at all times. As a minimum, conduct area monitoring daily on each shift in which lead paint removal operations are performed in areas immediately adjacent to the lead control area.

2. For outdoor operations, at least one sample on each shift shall be taken on the downwind side of the lead control area. If adjacent areas are contaminated, clean and visually inspect contaminated areas. The CIH shall certify that the area has been cleaned of lead contamination.

3.4 LEAD PAINT REMOVAL

A. Indoor Lead Paint Removal: Select paint removal processes to minimize contamination of work areas with lead-contaminated dust or other lead-contaminated debris/waste. This paint removal process should be described in the lead-containing paint removal plan. Perform manual sanding and scraping to the maximum extent feasible.

B. Mechanical Paint Removal and Blast Cleaning: Perform mechanical paint removal and blast cleaning in lead control areas using negative pressure full containments with HEPA filtered exhaust. Collect paint residue and spent grit (used abrasive) from blasting operations for disposal in accordance with EPA, state and local requirements.

C. Outside Lead Paint Removal: Select removal processes to minimize contamination of work areas with lead-contaminated dust or other lead-contaminated debris/waste. This paint removal process should be described in the lead-containing paint removal plan. Perform manual sanding and scraping to the maximum extent feasible.

3.5 LEAD PAINT CLEANUP DISPOSAL

A. Maintain surfaces of the lead control area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use compressed air to clean up the area. At the end of each shift and when the paint removal operation has been completed, clean the area of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner and wet mopping the area.

B. Certification: The CIH shall certify in writing that the inside and outside the lead control area air monitoring samples are less than 30 micrograms per cubic meter of air, the respiratory protection for the employees was adequate, the work procedures were performed in accordance with 29 CFR 1926.62, and that there were no visible accumulations of lead-contaminated paint and dust on the worksite. Do not remove the lead control area or roped-off boundary and warning signs prior to the Contracting Officer's receipt of the CIH's certification. Re-clean areas showing dust or residual paint chips.

C. Testing of Lead-Containing Paint Residue and Used Abrasive Where indicated or when directed by the Contracting Officer, test lead containing paint residue and used abrasive in accordance with 40 CFR 261 for hazardous waste.

D. Disposal:

1. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing, which may produce airborne concentrations of leadparticles.

2. Store removed paint, lead-contaminated clothing and equipment, and lead-contaminated dust and cleaning debris into U.S. Department of Transportation (49 CFR 178) approved 55-gallon drums. Properly label each drum to identify the type of waste (49 CFR 172) and the date lead-contaminated wastes were first put into the drum. Obtain and complete the Uniform Hazardous Waste Manifest forms. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

3. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing, which may produce airborne concentrations of lead particles. Label the containers in accordance with 29 CFR 1926.62. Dispose of lead-contaminated waste material at an approved hazardous waste treatment, storage, or disposal facility off Government property.

4. Store waste materials in U.S. Department of Transportation (49 CFR 178) approved 55-gallon drums. Properly label each drum to identify the type of waste (49 CFR 172) and the date the drum was filled. The Contracting Officer or an authorized representative will assign an area for interim storage of waste-containing drums. Do not store hazardous waste drums in interim storage longer than 90 calendar days from the date affixed to each drum.

5. Handle, store, transport, and dispose lead or lead-contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

6. Disposal Documentation: Submit written evidence that the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA and state or local regulatory agencies. Submit one copy of the completed manifest, signed and dated by the initial transporter in accordance with 40 CFR 262.

END OF SECTION

SECTION 02205

PROTECTION OF EXISTING FACILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Location of facilities.

B. Notification of owners and authorities.

C. Coordination and preparation.

D. Protection of facilities.

E. Relocation of facilities.

F. Protection of sewers and storm drains.

G. Protection of water mains near sewers.

H. Abandonment of utilities.

I. Restoration of property markers.

1.2 RELATED SECTIONS

A. Section 01312 - PRECONSTRUCTION CONFERENCE

B. Section 01322 - CONSTRUCTION PHOTOGRAPHS

C. Section 01562 – PROTECTION OF WORK AND PROPERTY

D. Section 02351 - EXCAVATION, BACKFILL AND TRENCHING

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 LOCATION OF FACILITIES

A. Prior to construction, verify location of existing underground facilities near or adjacent to project.

1. Consult with appropriate underground facilities protection organization (Dig Safely New York) and arrange for field stakeout or other markings to show locations.
2. Consult with OWNER to review any existing drawings that may show the locations of underground facilities.
3. Perform exploratory excavation at key junctures and other critical points to aid in ascertaining locations.

B. Report field stakeout findings and results of exploratory excavations to ENGINEER if possible changes in project location or design are indicated because of suspected interferences with existing facilities. Allow ENGINEER sufficient time to determine magnitude of changes and to formulate instructions in that regard.

C. If location of an existing underground facility is uncertain, apply careful excavation and probing techniques during construction to locate and avoid damage to same.

3.2 NOTIFICATIONS OF OWNERS AND AUTHORITIES

A. Prior to construction, notify owners of existing facilities, including local Police and Fire Departments, of general scope, nature and planned progress schedule of the Work.

B. Notify owners of nearby underground facilities when excavating is to take place in a particular area, allowing them reasonable time to institute precautionary procedures or preventive measures, which they deem necessary for protection of their facilities.

C. When existing utilities, such as sewer, water, gas, telephone or electric power are damaged or disturbed during construction, immediately notify affected OWNER and Project OWNER.

D. Notify Police and Fire Departments, including affected owners, immediately if hazardous conditions are created or have the potential for occurring, as a result of damage to an existing facility or as a result of other activities at project site. Hazardous conditions could be created from: fire, explosion, escape of gas, escape of fuel oil, gasoline or industrial fluids, downed electrical wires, and disrupted underground electrical cables.

3.3 COORDINATION AND PREPARATION

A. Discuss anticipated work schedule with local authorities and owners of utilities at preconstruction meeting, including procedures to be followed if one or more utilities are damaged or disrupted. Develop contingency plans to address CONTRACTOR's role in repair of damaged utilities.

B. Make preparations beforehand to repair and restore damaged utilities, including arrangements for standby materials and equipment to be promptly assembled at site and utilized immediately.

C. Adjust work schedules and personnel assignments as necessary to conform with requirements of utility owner whose utility is to be temporarily interrupted during construction. Cooperate with utility owner in this regard to minimize the time of interruption.

D. Make preparations for and conform to applicable requirements of New York State Industrial Code Rule 53 (as amended April 1, 1975) entitled, "Construction, Excavation and Demolition Operations at or Near Underground Facilities," issued by State Department of Labor.

3.4 PROTECTION OF FACILITIES

A. Plan and conduct construction operations so that operation of existing facilities near or adjacent to the Work, including electric, telephone, sewer, water, gas or drainage utilities, are sustained insofar as the requirements of the project will permit.

B. Protect existing facilities from damage or movement through installation of adequate support systems and use of proper equipment, including application of careful excavation and backfilling techniques in sensitive areas.

C. Protect existing water storage tanks from any movement or damage by all means possible. Immediately notify the ENGINEER if there is a risk of damage to the tank and/or tank foundations. Immediately stop associated work if damage is done and notify ENGINEER to assess the damage.

D. Existing utilities and other facilities which are damaged by the CONTRACTOR's construction operations shall be promptly repaired by CONTRACTOR to the satisfaction of the affected owner or, if he so elects, that owner will perform the repairs with his own forces. Under either arrangement, such repair work shall be done at CONTRACTOR's expense.

E. When aboveground visible facilities such as poles, wires, cables, fences, signs or structures constitute an unavoidable interference, notify ENGINEER and consult with affected owner regarding temporary removal and later restoration of the interfering item. Arrange with that owner to remove and later restore the interfering item to the satisfaction of the owner, subject to approval of the project OWNER; or, allow affected owner to perform such work with his own forces. Under either arrangement, such work shall be done at CONTRACTOR's expense.

F. Take all necessary precautions to prevent fires at or adjacent to the work, buildings, and other facilities. No burning of trash or debris is permitted. If permanent fire extinguishers are used, they shall be recharged and in "new" condition when turned over to OWNER.

3.5 RELOCATION OF FACILITIES

A. If the location or position of an existing gas or water pipe, public or private sewer or drain, conduit or structure be such as, in the opinion of ENGINEER, to require its removal, realignment or change, such alteration shall be without cost to the CONTRACTOR for the work of removal, realignment or change only.

B. Uncovering, supporting and sustaining such facility before its removal or before and after its realignment or change, shall be the CONTRACTOR's responsibility as part of the work of his Contract.

C. CONTRACTOR shall be entitled to extension of time for completion of entire Work as the ENGINEER determines that the entire Work was delayed by the removal, realignment or change of such obstruction.

3.6 PROTECTION OF SEWERS AND STORM DRAINS

A. Where existing sanitary sewers or storm drain systems are being replaced or interrupted, provide temporary bypass pumping or piping to maintain flow around that segment of the Work such that no back-ups occur in existing systems.

B. Existing sanitary sewer laterals damaged in the work or temporarily disconnected shall be restored to operation by the end of each work day. Existing sanitary sewer laterals crossing over new pipelines to be restored in accordance with details shown on the Drawings.

B. Maintain existing manholes, catch basins, and other utility structures in their pre-work condition. Any material or debris entering same due to the CONTRACTOR's operation shall be promptly removed.

3.7 PROTECTION OF WATER MAINS NEAR SEWERS

A. Where a minimum 10-foot horizontal separation or minimum 18-inch vertical separation (bottom of water pipe to top of sewer pipe) cannot be maintained between a water main and sewer line, one or more of the following remedies shall be incorporated in the work:

1. The sewer lines shall be encased in Mix C concrete for a length of 10 feet on either side of the water main.

2. Both the water main and sewer line shall be constructed of pressure type joints of ductile iron pipe, and shall be pressure tested to 100 psi to assure watertightness.
3. One full length of water main shall be centered over the sewer line, so that both joints will be as far from the sewer as possible.
4. Relocate water main to obtain 18 inches minimum vertical separation.

3.8 ABANDONMENT OF UTILITIES

A. Remove existing utilities to be abandoned within limits of trench excavation, or impinging on trench limits.

B. Open ends of abandoned utilities, or those scheduled for abandonment, shall be bulkheaded by brick masonry or Mix C concrete; or by cast iron plugs or caps in small diameter water mains.

C. Abandoned sewers 36-inch diameter or larger shall be completely filled with sand or gravel or other approved material prior to bulkheading the open end(s).

D. Abandoned manholes and water valve casings shall be backfilled to grade with approved trench backfill material.

E. Frames, covers, grates, water valve casing, sections of water piping, hydrants (including standpipe and boot) valves and other items to be abandoned shall, if ordered by OWNER, be salvaged for re-use and be delivered to OWNER's property yard.

3.9 RESTORATION OF PROPERTY MARKERS

A. Property corner markers, boundary monuments, etc., disturbed or moved by the CONTRACTOR's operation shall be restored, in conformance with the property deed description, by a licensed land surveyor. Restoration of the property corner markers or boundary monuments shall be certified by said surveyor on a map prepared by him, which shows the work accomplished. One copy of the map shall be given to the property owner and one copy given to the project OWNER.

END OF SECTION

SECTION 02316

SELECT GRANULAR MATERIALS

PART 1 GENERAL

1.1 DESCRIPTION

A. Work Specified - Select granular materials shall be used in bedding, pipe encasement, or backfill and as specified or as directed by the ENGINEER.

B. Related Work Specified Elsewhere:

1. Section 02100 – SITE CLEARING

2. Section 02351 - EXCAVATION, BACKFILL AND TRENCHING

3. Section 02900 - RESTORATION

1.2 QUALITY ASSURANCE

A. Reference Standards - NYSDOT Standards, latest revision.

1.3 SUBMITTALS

A. The CONTRACTOR shall furnish representative samples, sieve analysis and certification of specification compliance for the select granular materials to the ENGINEER and advise on the location of the source
.

B. The CONTRACTOR shall submit copies of proposed materials, methods and operations of backfilling and compaction to the ENGINEER for review prior to the start of work. A list of equipment to be used in CONTRACTOR's methods and operations must be included.

PART 2 PRODUCTS

2.1 MATERIALS

A. Bedding and Pipe Encasement

1. NYSDOT No. 1 Crushed Stone or Crushed Gravel – Bedding for PVC, DIP, and PCCP water main. Thoroughly washed, clean, sound, tough, hard, crushed limestone conforming to the requirements of NYSDOT Item No. 703.0201 or crushed gravel conforming to the requirements of NYSDOT Item No. 703.0202, having the following gradation by weight:

% Passing	Sieve
100	1-inch
90 - 100	1/2-inch
0 - 15	1/4-inch

2. NYSDOT No. 2A Crushed Stone or Crushed Gravel – Bedding for DIP and PCCP water main. Shall be a No. 1 and No. 2 blend, thoroughly washed, clean, sound, tough, hard, crushed limestone conforming to the requirements of NYSDOT Item No. 703.0201 or crushed gravel conforming to the requirements of NYSDOT Item No. 703.0202, having the following gradation by weight:

% Passing	Sieve
100	1-1/2-inch
93-100	1-inch
27-58	1/2-inch
0-8	1/4-inch

3. NYSDOT Concrete Sand – Bedding for copper and polyethylene tubing.
Washed, fine aggregate sand shall conform to the requirements of NYSDOT Item No. 703.07, having the following gradation by weight:

% Passing	Sieve
100	3/8-inch
90 - 100	No. 4
75 - 100	No. 8
50 - 85	No. 16
25 - 60	No. 30
10 - 30	No. 50
1 - 10	No. 100
0 - 3	No. 200

B. Select Backfill - NYSDOT Subbase Type 2 Crusher Run Stone or Crusher Run Gravel. Material shall conform to the requirements of NYSDOT Item No. 304.12, having the following gradation by weight:

% Passing	Sieve
100	2-inch
25 - 60	1/4-inch
5 - 40	No. 40
0 - 10	No. 200

C. Peagravel - NYSDOT Type 1A Screened Gravel for the annular space between the carrier pipe and the casing pipe. Screened gravel shall conform to the requirements of NYSDOT Item No. 703.0203 and have the following gradation by weight:

% Passing	Sieve
100	1/2-inch
90 - 100	1/4-inch
0 - 15	1/8-inch

D. Follow NYSDOT Standard Specifications if gradation data varies from those listed above.

E. Recycled concrete or asphalt pavement shall not be allowed.

F. Slag of any type shall not be allowed.

G. Flowable fill shall not be allowed.

PART 3 EXECUTION

3.1 INSTALLATION

A. Select granular material as specified or directed for water main bedding or encasement shall be placed in accordance with Sections 02351.

B. Select backfill where specified or directed shall be placed in accordance with the backfilling provisions of Section 02351.

3.2 DISPOSAL OF DISPLACED MATERIALS

A. Materials displaced through the use of the above materials shall be wasted or disposed of by the CONTRACTOR and the cost of such disposal shall be included in the appropriate bid item.

END OF SECTION

SECTION 02317

ROCK EXCAVATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Removal of subsurface rock encountered during excavation, utilizing mechanical methods.

B. Blasting is prohibited for this Work.

1.2 DESCRIPTION

A. Work Specified

1. The CONTRACTOR shall furnish all labor, materials, equipment, and incidentals necessary for rock excavation for construction of structures and pipelines as shown and specified. Disposal of excess and unsuitable excavated rock material is included in this item.

2. This item includes backfill of rock excavations with acceptable materials as defined in other Related Sections.

1.3 RELATED SECTIONS

A. Section 01100 - SUMMARY OF WORK

B. Section 02205 - PROTECTION OF EXISTING FACILITIES

C. Section 02316 - SELECT GRANUAL MATERIALS

D. Section 02351 - EXCAVATION, BACKFILL, AND TRENCHING

E. Section 03300 – CAST IN PLACE CONCRETE

1.4 REFERENCES

A. Code of Federal Regulations (CFR) - U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Construction Standards and Interpretation, 29 CFR Part 1926.

1.5 DEFINITIONS

A. “Rock” is defined to include all sound solid masses, layers and ledges of consolidated and indurated rock or mineral matter of such hardness, durability and/or texture that it is not rippable or cannot be excavated with normal earth excavation equipment.

B. All boulders and detached pieces of solid rock or concrete or masonry 1 cubic yard in volume or greater, shall be classified as “rock.”

C. Should a conflict arise as to the classification of the material to be removed, the following tests shall be used to aid in the determination:

1. Where practicable, a late model tractor-mounted hydraulic ripper equipped with a one digging point of standard manufacturer's design adequately sized for use with and propelled by a crawler-type tractor rated between 210 and 240 net flywheel horsepower, operating in low gear, shall be utilized. Should the suspect material not be effectively loosened or broken down by ripping in a single pass with the aforementioned ripper, the material shall be classified as "rock."

2. In situations where interbedded strata of "common excavation" material and "rock excavation" material are encountered in the same excavation, the individual classification of those materials shall be made on an average percentage basis of the occurrence of those materials as measured in stratigraphic sections as approved by the ENGINEER.

1.6 PROJECT/SITE CONDITIONS

A. Existing Conditions - Existing physical conditions as defined for design purposes are noted on the Drawings and are described in the Contract Documents.

1.7 SCHEDULING

A. Schedule work to avoid disruption to occupied buildings nearby.

B. Coordinate schedule with local police and fire departments, including owners of nearby existing facilities.

C. Schedule Work to coordinate with concrete placement. Reference Section 03300.

1.8 SUBMITTALS

A. Before any rock removal begins, the CONTRACTOR shall obtain all permits and licenses required by governing authorities having jurisdiction and supply certified copies to ENGINEER.

B. Submit procedures and list equipment to be used.

PART 2 PRODUCTS

2.1 DEFINITIONS

A. Rock shall be defined as hard cap rock or boulders exceeding one (1) cubic yard in volume and solid ledge rock which in the opinion of the ENGINEER, requires drilling and blasting or jackhammering for its removal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify site conditions and location of nearby buildings, structures and other facilities, recording irregularities, which exist prior to work of this section.

B. Verify locations of nearby underground utilities and structures.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum; establish quantity of rock to be removed to meet project requirements.

B. Conduct survey and document conditions of buildings and structures near locations of rock removal, photograph existing conditions identifying existing irregularities.

3.3 ROCK REMOVAL - GENERAL

A. Allow time for ENGINEER to take site measurements of rock quantities to be removed.

B. Cut away rock at bottom of excavation to form level bearing surface for structures.

C. Remove shaled layers to provide sound and unshattered base for footings, foundations, and pipe bedding.

D. In utility trenches, trim rock to at least 4 inches below bottom of installed pipe and 12 inches wider than outside diameter of installed pipe on each side.

E. Remove excavated materials from site.

F. Correct unauthorized rock removal with Section 03001 under direction of ENGINEER.

G. Under no circumstances will blasting be allowed. Explosive materials used primarily for blasting operations are not allowed on site.

3.4 ROCK REMOVAL - MECHANICAL METHOD

A. Excavate and remove rock by mechanical methods only at locations required by the Contract Documents and when trimming bottom or sides of excavation is necessary to meet project requirements.

B. Drill holes and utilize expansive tools, wedges, and/or mechanical disintegration compound, as appropriate, to fracture rock.

3.5 FIELD QUALITY CONTROL

A. Provide for ENGINEER’s observation of foundation bearing surfaces and cavities formed by removed rock.

3.6 GENERAL

A. Limits of Rock Excavation

1. Structures:

   a. The lowest elevation of the structure, manhole, pump station, plus bedding etc,. at each location or as directed by the ENGINEER.

   b. Vertical planes located 12 inches outside the footing or as shown on the Contract Drawings.

   c. As ordered by ENGINEER.

2. Pipe Trenches: The width of trenches shall be the outside diameter of the pipe plus 2 feet, exclusive of bells, branches, hubs, spurs or cradles. The sides of the trench shall be vertical.

   a. The depth of the trench shall be the depth on the bottom of the pipe exclusive of bells and branches plus bedding.

   b. The length shall be equal to the laid length of pipe, measured horizontally.

   c. Additional width in pipe trenches at field joints or beyond the lines described above will be considered outside the limits described.

   d. As ordered by the ENGINEER.

B. When there is a separate pay bid item for rock excavation, the rock shall be uncovered prior to removal in sections acceptable to the ENGINEER so that it may be measured.

C. When there is not a separate pay bid item for rock excavation, the rock shall be uncovered prior to removal in sections acceptable to the ENGINEER for observation and for record.

3.7 DISPOSAL

A. Backfill

1. Pieces of rock larger than 4 inches shall not be used in backfilling pipe trenches.

2. Rock backfill shall not be placed within two feet of the outside diameter of pipes.

3. The quantity of rock used in any backfill location shall not be so great as to result in voids, as determined by the ENGINEER.

4. Rock backfill shall not be placed within 18 inches of the surface of finish grade.

5. Excess or unacceptable rock may be disposed of on the site only where shown or specified by the ENGINEER. Rock, which cannot be disposed of on the site, shall be removed and disposed of off the site at the CONTRACTOR'S expense and in compliance with all applicable federal, state and local regulations.

B. The rock excavated, which cannot be incorporated into the backfill material, as specified, shall be disposed of as spoil and shall be replaced with the quantity of acceptable material for backfilling.

END OF SECTION

SECTION 02351

EXCAVATION, BACKFILL AND TRENCHING

PART 1 GENERAL

1.1 DESCRIPTION

A. Work Specified

1. The CONTRACTOR shall furnish all labor, materials, equipment, and incidentals necessary for excavation, trenching, and backfill as shown and specified. Disposal of excess and unsuitable excavated material is included.
2. Backfill of excavations with acceptable materials as specified in other sections.

B. RELATED SECTIONS

1. Section 01562 – Protection Of The Work And Property
2. Section 02100 – Site Clearing
3. Section 02205 – Protection Of Existing Facilities
4. Section 02316 - Select Granular Materials
5. Section 02900 - Restoration

1.2 QUALITY ASSURANCE

A. Reference Standards

1. ASTM A36, Structural Steel
2. ASTM A328, Steel Sheet Piling
3. ASTM D422, Particle-Size Analysis of Soils
4. ASTM D698, Moisture-Density Relations of Soils, using 5.5 lb. Rammer and 12-inch Drop
5. ASTM D1556, Density of Soil in Place by the Sand-Cone Method
6. ASTM D1557, Moisture-Density Relations of Soils, using 10 lb. Rammer and 18-inch Drop
7. ASTM D2321, Recommended Practices for Underground Installation of Pipe for Sewers and Other Gravity Flow Applications
8. ASTM D2922, Density of Soil and Soil-Aggregate in Place by Nuclear Method (Shallow Depth)
9. AISC Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings
10. Occupational Safety and Health Administration (OSHA) Regulations
11. Industrial Code Rule 23
12. Public Law 91-596 (Williams Steiger Act)
13. NYS Industrial Code Rule 53

1.3 SUBMITTALS

A. Before any excavation begins, the CONTRACTOR shall obtain all permits and licenses required by governing authorities having jurisdiction and submit certified copies to ENGINEER prior to work being performed.

B. The CONTRACTOR shall submit drawings submitted with a professional engineer stamp, for information only, for the following items as required:
   1. Sheeting, shoring and bracing.
   2. Dewatering systems.
   3. Cofferdams.
   4. Additional excavation protection systems required.
   5. Underpinning.
   6. Underdraining.
   7. Sediment and erosion control.
   8. Boring and Receiving Pits.

C. The CONTRACTOR shall submit proposed materials, methods and operations of backfilling and compaction to the ENGINEER for review prior to the start of work. A list of equipment to be used in CONTRACTOR's methods and operations must be included.

D. All drawings shall be prepared and sealed by an independent professional engineer recognized as an expert in the specialty involved and licensed to practice in the State of New York. The drawings shall be submitted to the ENGINEER to establish compliance with the terms of the Contract Documents. Calculations shall not be submitted. Drawing submissions will not be checked and will not imply approval by the ENGINEER of the work involved. CONTRACTOR shall be wholly responsible for designing, installing, and operating whatever system is necessary to accomplish satisfactory sheeting, bracing, protection, underpinning, and dewatering.

1.4 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the Work are as shown on Drawings, or as provided by the ENGINEER.

PART 2 PRODUCTS

2.1 MATERIALS

A. Bedding and Select Backfill - Bedding and select backfill material shall be in accordance with Section 02316.

B. Backfill and Fill Materials

   1. Excavated materials may be used for backfill provided:
      a. Material is sandy, loamy or similar to bank run gravel.
      b. Material is free of debris, hazardous materials, frozen materials, organic or other deleterious materials. Material greater than 4 inches in any direction is unacceptable. Material greater than 2 inches in any direction is unacceptable for backfill directly against the water main.
      c. Maximum dry density and optimum moisture content are determined in accordance with the above.
      d. Material is reviewed and deemed acceptable by the ENGINEER.

   2. Use select granular backfill in accordance with Section 02316 within 5 feet or within a 1 on 1 slope from the trench to the edge of pavement of all roadways.

C. Topsoil - Topsoil shall be furnished and installed and coordinated with Section 02900.

D. Sheeting, Shoring and Bracing:

1. Used material shall be in good condition, not damaged or excessively pitted. Unless otherwise specified, all sheeting to remain in place shall be new. New or used sheeting may be used for temporary work.
2. All timber used for breast boards (lagging) shall be new or used, meeting the requirements for Douglas Fir Dense Construction grade or Southern Pine No. 2 Dense S3. Where close or tight sheeting is required, wood sheeting shall be tongued and grooved.
3. All steel work for sheeting, shoring, bracing, etc. shall be designed in accordance with the provisions of the "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" of the AISC, except that field welding will be permitted.
4. Steel sheet piling shall be manufactured from steel conforming to ASTM A328. Steel soldier piles, wales and braces shall be new or used and shall conform to ASTM A36.
5. Steel sheeting shall have a minimum thickness of 3/8-inch in web, unless otherwise specified.

E. Explosives:

1. Explosives are not allowed to be used nor allowed on site.

PART 3 EXECUTION

3.1 INSPECTION

A. The CONTRACTOR shall provide the ENGINEER with sufficient time and means to examine the areas and conditions under which excavating, filling and grading are to be performed. The CONTRACTOR shall notify the ENGINEER of conditions detrimental to the proper and timely completion of work. The CONTRACTOR shall not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the ENGINEER.

3.2 TEST PITS

A. Where shown or ordered by the ENGINEER, the CONTRACTOR shall excavate and backfill test pits in advance of construction to determine conditions or location of existing facilities. The CONTRACTOR shall perform all work required in connection with excavating, stockpiling, maintaining, sheeting, shoring, backfilling and restoring the surface for the test pits.

B. Test pits, which the CONTRACTOR excavates, that are not shown on the Drawings or specified or ordered shall be at the CONTRACTOR's expense.

C. No test pits will be dug prior to utility company stakeout.

D. Cold patch for temporary repair shall be placed as directed by the ENGINEER.

3.3 EROSION CONTROL

A. See Specification Section 01564.

3.4 EXCAVATION

A. The CONTRACTOR shall perform all excavation required to complete the work as shown and specified. Excavations shall include earth, sand, clay, gravel, hardpan, boulders and ledge rock, decomposed rock, pavements, rubbish and all other materials within the excavation limits, except rock. Where the excavation

is in rock meeting the definition in Section 02226 (requiring drilling, jackhammering and hand removal), the rock shall be removed as specified in Section 02226.

B. Excavations for pipelines, utilities and structures shall be open excavations, shored and braced where necessary, according to OSHA standards, to prevent possible injury to workmen and to new and existing structures or pipelines. CONTRACTOR shall designate a "competent person" [29 CFR 1926.32(f)] who shall be responsible for complying with OSHA 29 CFR 1926.

C. Where the pipeline, utility or structure is to be placed below the groundwater table, wellpoints, or other acceptable methods shall be used to permit construction under dry conditions. Dry conditions shall prevail until concrete has reached sufficient strength to withstand earth and hydrostatic loads and until the pipelines are properly jointed, tested and backfilled.

D. Pumping in excavations shall be done in such a manner so as to prevent damage to the existing subgrade, and to prevent the carrying away of unsolidified concrete materials.

E. Excavations for pipelines shall be made sufficiently wide to permit proper laying and jointing of the pipe. The trench width at the top of the pipe should not be greater than the outside diameter of the pipe barrel plus 2 feet, but shall be sufficient to allow thorough compacting of earth refill adjacent to the bottom half of the pipe. The depth of trench shall be sufficient to allow a minimum cover over the top of the pipe as shown on the drawings. The use of excavating equipment, which requires the trench to be excavated to an excessive width, will not be allowed. All trenches for buried piping shall be excavated at least 6 inches below the bottom of the pipe and backfilled with pipe bedding material as specified in Section 02316.

F. Acceptable excavated materials shall be stockpiled in specified areas until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.

1. Locate and retain soil materials away from edge of excavations.
2. Unsuitable backfill material shall be kept separate from all other material and shall be disposed of as specified hereinafter. Disposal of unsuitable and excess excavated material shall be accomplished immediately upon removal from the excavation.
3. Stockpiles shall not be located such that they interfere with traffic or access to public or private property. If necessary, the CONTRACTOR shall maintain additional stockpile areas located elsewhere on the site, and shall transport the suitable backfill material to and from such stockpile areas as required for the work.
4. In built-up districts and in streets where traffic conditions render it necessary, the material excavated from the initial opening shall be removed by the CONTRACTOR as soon as excavated, and the material subsequently excavated, if suitable for the purpose, shall be used to backfill the trenches in which pipe has been laid or structures have been built, and neither the excavated material nor materials of construction shall be stored on the streets or sidewalks.

G. If the material at the design grade is unsuitable as determined by the ENGINEER, the CONTRACTOR, when ordered in writing, shall excavate additional material to the depth necessary and shall backfill to the proposed grade with select granular material.

H. Unless otherwise directed or permitted, not more than 100 feet of trench in advance of the end of the completed pipe or structure therein shall be opened at any time. Every trench in rock shall be fully opened at least 30 feet in advance of any place where masonry or pipe is being laid. Any time when the CONTRACTOR's crews are not on the job working, a trench length equal to or less than one-half of the last length of pipe installed may be left open, but properly covered or barricaded to protect the public.

I. At such locations where two pipes may be installed in parallel in a common trench, and where specified, the CONTRACTOR shall install the pipes a minimum of 2 feet apart as measured horizontally from the outside diameter of pipe.

3.5 UNAUTHORIZED EXCAVATION

A. All excavation outside the lines and grades shown and not specified, together with the removal and disposal of the associated material shall be at the CONTRACTOR's expense. The unauthorized excavation shall be filled as directed by the ENGINEER with select compacted backfill at the CONTRACTOR's expense. Claims and damages resulting from the CONTRACTOR's unauthorized excavation will be his sole responsibility.

3.6 DRAINAGE AND DEWATERING

A. General:

1. Prevent surface and subsurface water from flowing into excavations and from flooding adjacent areas.
2. Remove water from excavation as fast as it collects.
3. Maintain the ground water level at least 2 feet below the bottom of the excavation to provide a stable surface for construction operations and to prevent damage to the work during all stages of construction.
4. Provide and maintain pumps, sumps, suction and discharge lines and other dewatering system components necessary to convey water away from excavations.
5. Provide sediment traps when water is conveyed into watercourses.
6. Notify the ENGINEER before shutting down dewatering systems for any reason.
7. Standing water shall not be permitted in the excavation at any time. If the material at the design grade becomes unsuitable or contaminated due to the actions of the CONTRACTOR, the CONTRACTOR shall excavate additional material to the depth necessary and shall backfill to the proposed grade with select fill or crushed stone.
8. 100 percent standby pumps (gasoline powered) shall be maintained at the site at all times.
9. Any hardships created by the temporary dewatering for this contract which adversely affects the water supply to local property owners, shall be satisfactorily resolved by the CONTRACTOR, including the provision of temporary water service, if required, at no additional cost to the OWNER.
10. Obtain required permits from agencies of jurisdiction, NYSDEC, and USACOE, for any water being discharged into rivers, streams, or watercourses.
11. Examine adjacent structures and utilities, both existing and under construction, for possible settlement, movement or other adverse effects resulting from dewatering methods or water removal. Take necessary precautionary steps to protect such structures and utilities.

B. Disposal of Water Removed by Dewatering Systems:

1. Dispose of all water removed from the excavation in such a manner as not to endanger public health, property, or any portion of the work under construction or completed.
2. Dispose of water in such a manner as to cause no inconvenience to the OWNER or others on or adjacent to the site.
3. Convey water from the excavation in a closed conduit. Do not use trench excavations as temporary drainage ditches.
4. Disposal of water shall be by specified methods and shall not cause erosion or sedimentation to occur in existing drainage systems. All sedimentation or blocking of existing systems shall be thoroughly cleaned and returned to original condition by the CONTRACTOR at his expense.
5. Damage caused by the CONTRACTOR's operations to public or private property shall be repaired by him to the satisfaction of the ENGINEER and the damaged property owner at the CONTRACTOR's expense.
6. The CONTRACTOR shall perform all work, furnish all materials and install all measures required to reasonably control soil erosion resulting from construction operations and prevent excessive flow of sediment from the construction site. Such work may include the installation of water diversion structures, diversion ditches and sediment basins and seeding, mulching or sodding

critical areas to provide temporary protection. The CONTRACTOR shall submit a plan showing the methods to be used for controlling erosion and sedimentation during construction along with the schedule of construction operations to the ENGINEER for review.

7. All erosion and sediment control practices shall be in place prior to any grading operations and installation of proposed structures or utilities.
8. All erosion and sediment control practices shall be left in place until construction is completed and\or area is stabilized.
9. Where necessary, disturbed areas shall be temporarily seeded and\or mulched until proper weather conditions exist for establishment of a permanent vegetative cover.

3.7 SHEETING, SHORING, AND BRACING

A. General:

1. Unless otherwise shown or specified, excavations shall be open, shored and braced or sheeted where necessary to prevent injury to workmen, structures, pipelines and utilities.
2. Structures within 100 feet of sheeting installations shall be subject to a preconstruction survey to identify and record existing structural conditions. In the instance of private residencies, the homeowners shall be contacted directly. These inspections shall be carried out by a pre-inspection firm experienced in this line of work.
3. During the actual construction process, the CONTRACTOR shall provide the monitoring and recording of the actual vibrations generated. A baseline of ambient vibration levels shall be established prior to driving sheet piling.
    a. The particle acceleration during the driving of the sheet piling shall not exceed 2.0 feet per second.
    b. The CONTRACTOR will be required to change the construction methods if the work is resulting in unacceptable vibration levels.
4. All municipal, county, state, and federal ordinances, codes, regulations, and laws shall be observed. The CONTRACTOR shall provide all sheeting, shoring, and bracing which conforms to Public Law 91-596 (Williams Steiger Act), New York State Department of Labor Industrial Code Note 23, and all applicable sections of the 1970 Occupational Safety and Health Act (OSHA), and any other requirements as necessary.
5. All municipal, county, state and federal ordinances, codes, regulations, laws and OSHA regulations shall be observed.
6. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down the shoring and bracing as excavation progresses.
7. Safe and satisfactory sheeting, shoring and bracing shall be the entire responsibility of the CONTRACTOR.
8. The CONTRACTOR shall be held accountable and responsible for the sufficiency of all shoring and bracing used and for all damage to persons or property resulting from the improper quality, strength, placing, maintaining or removing of the same.
9. The ENGINEER’s permission to proceed with work in either a sheeted, shored braced or open trench condition shall in no way relieve the CONTRACTOR from the above responsibilities.
10. The clearances and types of temporary structures, insofar as they affect the character of the finished work, and the design of steel sheeting to be left in place, will be subject to the review of the ENGINEER, but the CONTRACTOR shall be solely responsible for the adequacy of all sheeting, shoring, bracing, cofferdamming, etc.
11. Unless otherwise shown, specified, or ordered, all materials used for temporary construction shall be removed when work is completed. Such removal shall be made in a manner not injurious to the pipelines or structures.
12. All steel sheet piling designed to remain in place shall be new materials. New or used materials may be used for temporary work.
13. Steel sheet piling shall be manufactured from steel conforming to ASTM A328. Steel for soldier piles, wales, and braces shall be manufactured to conform to ASTM A36.

14. No excavation shall be performed below a line drawn down and away at a slope of two horizontal and one vertical from the nearest footing of the existing structure without providing sheeting, shoring, and bracing.

B. Sheeting Left in Place:

1. Steel sheet piling shall be left in place or where conditions are such that the removal of sheeting will endanger the work or adjacent pipes or structures or when ordered in writing to be left in place by the ENGINEER. It shall consist of rolled sections of the continuous interlocking type unless otherwise specified. The type and design of the sheeting and bracing shall conform to the above specifications for all steel work for sheeting and bracing.
2. Steel sheet piling to be left in place shall be driven straight to the lines and grades as shown or directed. The piles shall penetrate into firm materials with secure interlocking throughout the entire length of the pile. Damaged piling having faulty alignment shall be pulled and replaced by new piling.
3. The type of guide structure used and method of driving for steel sheet piling to be left in place shall be submitted to the ENGINEER for review. Jetting will not be permitted.
4. The CONTRACTOR shall cut off piling left in place at least 2 feet below road surface or to the grades shown or ordered by the ENGINEER and shall dispose of the cutoffs.
5. Portions of sheeting or soldier piles and breast boards, which are in contact with concrete, shall be left in place.

C. Removal of Sheeting and Bracing:

1. Sheeting and bracing shall be removed from excavation unless otherwise indicated by the ENGINEER. Removal shall be done so as to not cause injury to the work.
   a. Wood or steel sheeting shall not be removed when adjacent to structures, pavement, pipes, or any other public or private property where removal may cause damage to such property.
   b. Fill all voids left by removal of sheeting with select fill.
2. Removal of sheet piling shall be done so as not to cause injury to the Work. Removal shall be equal on both sides of excavation to ensure no unequal loads on pipe or structures.

E. In areas where the Contract Drawings call for sheeting to remain in place, alternate sheeting methods will not be allowed. Only pre-driven, steel sheet piling systems designed for the CONTRACTOR by a professional engineer will be allowed in these areas.

3.8 BACKFILL AND COMPACTION

A. All backfill required for trenches and structures required to provide the finished grades shown and as described herein shall be furnished, placed and compacted in 6-inch lifts by the CONTRACTOR. Unless otherwise specified or required, fill shall be obtained from the excavated materials. All materials used for filling and backfilling shall be soil of acceptable quality, free from boulders, frozen lumps, wood, stumps, sludge, or other organic matter or other deleterious or hazardous materials. Excavated materials meeting these requirements and approved by the ENGINEER may be used as backfill.

B. Rock and/or earth material may be encountered during the work that is unsuitable for backfilling. When this material is encountered, it shall be disposed of in the specified manner, possibly resulting in a shortage of suitable backfill material. In this event, the CONTRACTOR shall be responsible for furnishing, delivering and installing clean earth or select backfill materials to properly and completely backfill the excavation. Backfill material for these situations may be obtained from other areas of the project where suitable material is available or from offsite locations as approved by the ENGINEER. All backfill material is subject to the ENGINEER's review and must meet the minimum requirements of the specifications above.

C. Backfill excavations as promptly as work permits, but not until completion of the following:
   1. Inspection by the ENGINEER of all work within the excavation.
   2. Inspection, testing approval, and recording of locations of underground utilities, connections, branches, structures and other facilities.
   3. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in a manner to prevent settlement of the structure or utilities, or leave in place if required.
   4. Removal and proper disposal of trash and debris.

D. Excavation shall be kept dry during backfilling operations. Backfill around piping and structures shall be brought up evenly on all sides.

E. The minimum density to be obtained during backfilling operations shall be 95 percent and is a percentage of the maximum density obtained in the laboratory as defined in ASTM D698 Method C including Note 2. This percentage is of modified Proctor density. In-place density determinations shall be made using a sand density cone or equivalent method as specified by ASTM D1556. If any bricks, bottles, pieces of metal, debris or other foreign matter larger than 3/4-inch size are encountered in the density test hole, a different test location shall be chosen. The ENGINEER will determine the frequency of field testing required to determine the density of the fill and shall direct the number and location of density tests. All equipment necessary to determine fill density, including nuclear density meters, shall be supplied by the CONTRACTOR.

F. The water content of fill material shall be controlled during placement within the range necessary to obtain the density specified. In general, the moisture content of the fill shall be within 5 percent dry and 2 percent wet of the optimum moisture content for the specified density as determined by laboratory tests. The CONTRACTOR shall perform all necessary work to adjust the water content of the material to within the range necessary to permit the density specified. No fill material shall be placed and no compaction of fill will be permitted when there is any standing water in the trenches or when the fill material or the ground the fill is to be placed on is frozen.

G. The CONTRACTOR is not allowed to access any part of an existing water supply system (fire hydrants, etc.) as a source of water for any reason during construction activities, including the use of water for backfilling to obtain the proper moisture content.

H. If the specified densities are not obtained because of the CONTRACTOR's improper control of placement or compaction procedures, or because of inadequate or improperly functioning equipment, the CONTRACTOR shall perform whatever work is required to provide the specified densities. This work shall include complete removal of unacceptable fill areas, replacement and recompaction until acceptable fill is provided.

I. Pipe Trench Preparation:

   1. Braced trench width shall be minimized to greatest extent practical but shall conform to the following:
      a. Trench width shall be sufficient to provide room for installing, jointing and inspecting piping, as shown on Contract Drawings.
      b. Enlargements at pipe joints may be made if required and specified by the ENGINEER.
      c. Trench width shall be sufficient for sheeting, bracing, sloping, and dewatering.
      d. Trench width shall be sufficient to allow thorough compacting of backfill.
      e. Do not use excavating equipment, which requires the trench to be excavated to excessive width.
   2. Depth of trench shall be as shown. If required, depths may be revised as specified by the ENGINEER.
   3. Where pipe is laid in rock excavation, crushed stone or gravel fill shall be carefully placed and tamped over the rock before the pipe is laid. After laying pipe, the balance of the backfill shall be placed as described herein above.

J. Preparation for Structures:

1. Generally, compact subgrade to density requirements for subsequent backfill materials.
2. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with Type B gravel fill and compact to density equal to or greater than requirements for subsequent backfill materials.
3. Inspect spaces to be backfilled and remove all unsuitable materials including sheeting, bracing, forms, and debris prior to commencing backfilling operations.

K. Placement for Pipes:

1. Place pipe bedding, select backfill and/or earth backfill or borrow materials, as specified herein.
2. All backfill in pipe trenches shall be placed in horizontal layers not exceeding 6 inches in depth and thoroughly compacted before the next layer is placed.
3. Trenches under roadways shall be backfilled with select backfill material for the entire length of the open cut crossing plus 5 feet back from the edge of pavement or a distance equal to a 1 on 1 slope to the invert, whichever is greater.
4. Where shoulders are excavated, the trench shall be backfilled with select granular material.
5. The entire trench area under driveways, parking areas, and sidewalks, shall be backfilled with select granular material in accordance with the Contract Drawings and Specifications.
6. Prior to commencing with the backfilling operation, the CONTRACTOR shall submit information to the ENGINEER such as catalog cuts, specification sheets, etc., describing the type of compaction equipment he intends to use.

L. Placement for Structures:

1. Backfill shall be placed in layers and thoroughly compacted by mechanical means as outlined in these specifications
2. Where pipelines or conduits are to be placed on structural backfill, all backfill under the pipes shall be Size D-2 crushed stone placed in 8-inch layers and mechanically tamped, unless an alternate method of supporting such pipes is specified.
3. Hydraulic compaction by ponding or jetting will not be permitted except in very unusual conditions and then only upon written request and demonstration of its effectiveness by the Contractor and the written acceptance by the Engineer.
4. Backfill against supported structure walls that are properly shored and braced or of sufficient strengths to withstand lateral soil pressures.
5. Backfill simultaneously on each side of unsupported foundation walls.

M. The CONTRACTOR shall repair any settlement that occurs at no additional cost to the OWNER.

3.9 GRADING

A. General - Uniformly grade areas within limits of grading under this Section including adjacent transition areas. Smooth subgrade surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

B. Turfed Areas - Finish areas to receive topsoil to within not more than 1 inch above or below the required subgrade elevation.

C. Walks and Pavements - Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 1/2 inch above or below the required subgrade elevation.

D. Slabs - Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 3 inch when tested with a 10-foot straightedge.

E. Compaction - After grading, compact subgrade surfaces to the depth and percentage of maximum density required.

F. All existing drainage swales and ditches, if disturbed, shall immediately, upon completion of pipe installation, be restored to proper lines and grades. CONTRACTOR shall ensure the final drainage facilities are in working condition and acceptable to the agency of jurisdiction.

3.10 PIPE ENCASEMENT

A. General - Place subbase material, in layers of specified thickness, over ground surface to support the pavement base course. In the event an underground pipe is shown under a base slab, the pipe shall be encased in concrete for its entire length under the slab in accordance with details shown on the Drawings. Where no detail is shown, encasement shall be formed to provide a minimum of 8 inches of concrete cover reinforced with #5 reinforcing bars spaced 12 inches each way. When the top of the pipe is within 12 inches of the bottom of the slab, the encasement shall be tied to the base slab with reinforcing. The General CONTRACTOR shall be responsible for encasement of all pipes under slabs including piping by other contracts.

3.11 PAVEMENT SUBBASE COURSE

A. General - Place subbase material, in layers of specified thickness, over ground surface to support the pavement base course.

B. Grade Control - During construction, maintain lines and grades including crown and cross-slope of subbase course.

C. Shoulders - Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials as specified, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least 12-inch width of shoulder simultaneously with compacting and rolling of each layer of subbase course.

D. Placing - Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations. When a compacted subbase course is shown to be 6 inches thick or less, place material in a single layer. When shown to be more than 6 inches thick, place material in equal layers, except no single layer more than 6 inches or less than 3 inches in thickness when compacted.

3.12 DISPOSAL OF EXCAVATED MATERIALS

A. Material removed from the excavations which does not conform to the requirements for fill or is in excess of that required for backfill shall be hauled away by the CONTRACTOR and disposed of in compliance with municipal, county, state, federal or other applicable regulations at no additional cost to the OWNER.

B. The CONTRACTOR shall not dispose waste excavated material in any of the following locations:
   1. Wetland areas.
   2. Floodplains.
   3. Any area where excess siltation will damage or pollute receiving water.
   4. Disposal of excess materials shall only be allowed at locations approved by NYSDEC Region 9.

3.13 RESTORATION AND CLEANUP

A. Following installation, the CONTRACTOR shall restore all areas to their original condition to the requirements of Section 02900 and to the satisfaction of the ENGINEER.

END OF SECTION

SECTION 02500

PAVING AND SURFACING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section includes the requirements of paving and surfacing including, but not limited to, the following:

1. Hot -- Mix Hot - Laid Bituminous pavements
2. Hot – Mix Hot - Laid Bituminous driveways and parking lots
3. Shoulder replacement and restoration
4. Testing as specified

1.2 RELATED SECTIONS

A. Section 02316 – Select Granular Materials

B. Section 02351 – Excavation, Backfill, and Trenching

C. Section 02900 – Restoration

1.3 REFERENCES

A. Latest revision of Standard Specifications for New York State Department of Transportation.

B. ASTM D1557, Moisture-Density Relations of Soils, Using 10.0 lb. (4.5kg) Rammer and 18-in. (457.2 mm) Drop.

1.4 QUALITY ASSURANCE

A. General: Testing of materials and of compaction requirements for compliance with technical requirements of the Specifications shall be the duty of a testing laboratory provided by the CONTRACTOR.

B. Responsibilities and Duties of CONTRACTOR: The use of testing service shall in no way relieve the CONTRACTOR of his responsibility to furnish materials and construction in full compliance with the Contract Documents. To facilitate testing service, the CONTRACTOR shall:

1. Secure and deliver to the ENGINEER and the testing laboratory representative samples of the materials he proposes to use and which are required to be tested.
2. Furnish such casual labor as is necessary to obtain and handle samples at the Project or at other sources of material.
3. Advise the testing laboratory and ENGINEER sufficiently in advance of operations to allow for completion of quality tests and for the assignment of personnel.

1.5 SUBMITTALS FOR REVIEW

A. Design Mix: The design mix for the plant hot mix surface course and base course, based upon the aggregate to be furnished, shall be determined by the testing laboratory provided by the CONTRACTOR and submitted to the ENGINEER for approval. The design mix shall include the percentage of asphalt cement to be used per unit weight of dry aggregate. The design mix, upon acceptance by the ENGINEER, shall be the basis for the field mix to be used in asphalt pavement construction.

B. Materials certificates certifying compliance with Specifications, when requested by ENGINEER.

C. Test Reports.

1.6 REGULATORY REQUIREMENTS

A. All pavement restorations shall be in accordance with the agency having jurisdiction and the associated permits issued for construction of the Project.

1.7 WARRANTY – Not Used

PART 2 PRODUCTS

2.1 MATERIALS

A. Paving and Base Course Materials: The source of materials shall be acceptable to the ENGINEER. Materials shall conform to the following:

1. Pavement Subbase Course Material: See Section 02316 and Section 02351.

2. Tack Coat: NYSDOT Section 702, Item 702-3401 Asphalt Emulsion (HFMS-2H).

3. Bituminous Base Course: NYSDOT, Item 403.118902, Type 1, Base Course.

4. Bituminous Binder Course: NYSDOT, Item 403.138902, Type 3, Binder Course.

5. Bituminous Surface Course: NYSDOT, Item 403.198302, Type 7F3, Top Course.

2.2 MATERIALS TESTING

A. All materials must be tested and approved prior to delivery to the site. Samples of materials proposed for use shall be submitted by the CONTRACTOR to the ENGINEER and the testing laboratory. Samples of the materials shall be submitted at least ten (10) days in advance of its anticipated use.

B. No paving or base course material shall be replaced or substituted without the ENGINEER's approval after approval of a mix design has been obtained by the CONTRACTOR.

PART 3 EXECUTION

3.1 GENERAL

A. All pavements, driveways, parking areas, and shoulders that are removed, damaged, or disturbed during the construction work under this Contract shall be replaced, or restored at the direction of the ENGINEER.

3.2 SUBGRADE PREPARATION

A. Preparation of the subgrade including compaction shall be as specified in Section 02351 of these Specifications.

3.3 CONSTRUCTION OF PAVEMENTS, DRIVEWAYS, AND PARKING LOTS

A. New asphalt drives shall include the course type and depth indicated on the Contract Drawings.

B. Sawcutting Pavements:

1. Prior to placing any permanent pavement, the CONTRACTOR shall sawcut all exposed edges of existing pavements to straight and even lines parallel to the centerline of the trench.

2. Sawcuts shall be approved by the ENGINEER prior to placing any permanent pavement.

3. Sawcuts shall be made by a machine suitable for the use and shall be capable of making straight, even and fine cuts completely through the existing pavement in one pass.

4. Where existing pavement has been undermined, the CONTRACTOR shall cut back the pavement to a location where a solid subbase is available.

5. All existing pavement edges at roads, driveways, and parking lots shall be sawcut by the CONTRACTOR prior to installation of the permanent pavement materials.

6. All sawcuts shall conform to the applicable requirements of the NYSDOT standards.

C. Sub-Base Course: Refer to Specifications Section 02351.

D. Installation of Bituminous Courses:

1. Bituminous pavements shall include Subbase, Base Course, and Surface Course Pavement. Where required by the agency of jurisdiction, a Binder Course Pavement may also be required. Bituminous paving materials shall conform to Part 2.1 of this Section of Specifications.

2. Installation of bituminous pavements shall conform to the applicable sections of NYSDOTSS Specifications.

3. Final Base Course Pavement shall be deferred at least six (6) weeks after the trench area has been exposed to traffic or as approved by the ENGINEER.

4. Temporary surfacing materials shall be removed and exposed edges of the existing pavement shall be sawcut to straight even lines, parallel to the centerline of the trench. Exposed faces of the existing pavement shall be clean and free from dirt or other substances, which would prevent proper bonding with the new pavement. The edge of the new pavement must extend to a minimum of one foot past the edge of the trench excavation or further as required to firm ground. Depressions shall be filled in the pavement sub-base or material removed to permit installation of the full thickness of base section.

The CONTRACTOR shall maintain the Base Course Pavement in good condition until the Binder Course Pavement or Surface Course Pavement is constructed.

5. Base Course Pavement shall be constructed in maximum lifts of 4 inches per course. Base Course Pavements required in thickness greater than 4 inches shall be constructed and compacted in lifts of not greater than 4 inches.

6. Prior to installation of the Binder Course Pavement (if required) or top Course Pavement, a tack coat shall be applied to clean, dry bituminous Base Course. The tack coat shall be applied with a pressure distributor of approved design. Apply each tack coat application at a rate of 0.4 gallons per square yard and at a temperature between 50 degrees F and 120 degrees F. Two applications of tack coat shall be applied immediately prior to installation of Binder Course Pavement (if required) or Surface Course Pavement.

7. Binder Course Pavement, if required by the agency of jurisdiction, shall be installed after the Base Course Pavement has been approved by the ENGINEER, and the tack coat has been applied as specified above. The minimum compacted thickness of Binder Course Pavement shall be as required by the agency of jurisdiction. Binder Course Pavement shall be installed in maximum lifts of 2 inches per course. Binder Course pavements required in thickness greater than 2 inches shall be constructed and compacted in lifts not greater than 2 inches.

8. Prior to installation of the Surface Course Pavement, a tack coat shall be applied to a clean, dry bituminous binder course pavement. Tack coat shall conform to specifications outlined above.

9. Surface Course Pavement shall be installed after the Base Course (or Binder Course) has been approved by the ENGINEER and the tack coat has been applied as specified above. One lift of the Surface Course may be placed in the trench provided that the settlement of the Base Course or Binder Course has not exceeded 1/2-half inch. If the settlement has exceeded 1/2-half inch, the Base Course or Binder Course leveling course shall be used to bring the Base Course or Binder Course up to the required grade. The minimum compacted thickness of Surface Course Pavement shall be as required by the agency of jurisdiction. Surface Course Pavements shall be installed in maximum lifts of 2 inches per course.

10. The bituminous course mixtures shall be hauled to the site of paving and placed as soon as possible after mixing.

11. The placement of the bituminous courses shall be completed over the full width of the section under construction on each day's run.

12. The mixture shall be laid on the prepared surface with an approved finishing machine which has an edging attachment and which will lay the wearing course true and level to the required profile. Variations from this profile shall not exceed 1/4-inch in 12 feet after rolling. The mixture shall be spread at such thickness as to give the required final compacted thickness of bituminous concrete surface course when well compacted with a suitable roller until 92 percent of theoretical maximum density is obtained.

E. Construction Joints:

1. Construction joints shall be made in such a manner as to ensure a neat junction, thorough compaction, and bond throughout.

2. A transverse joint extending over the full width of the strip being laid and at a 45-degree angle to its centerline shall be constructed at the end of each day's work and at any other times when the operations of placing the hot mixture are suspended for a period of time, which will permit the mixture to chill. The forward end of a freshly laid strip shall be thoroughly compacted by rolling before the mixture

has become chilled. When work is resumed, the end shall be cut vertically for the full depth of the layer.

3. When new pavement is to joint existing or previously laid pavement, the existing pavement shall be neatly and carefully edged at a 45-degree angle to the centerline to allow for jointing and feathering of the new surface course material. A tack coat of bituminous prime coat material shall be placed at the interface of new and existing material. Tack coat shall conform to Part 2.1 of this Section of Specifications.

4. Previously laid surface coarse pavement shall be tapered back 18-inches from each edge of trench to allow overlap for new surface course.

F. Bituminous Driveways and Parking Lots:

1. Installation of bituminous and concrete parking lots and driveways shall be in accordance with applicable NYSDOT specifications.

2. Bituminous materials shall be NYSDOT approved hot-mix surface course material as specified under Part 2.1 of this Section of Specifications.

3. Installation of material shall be as specified in this Section.

3.4 SHOULDER RESTORATION AND REPLACEMENT

A. Shoulder Restoration and Resurfacing:

1. CONTRACTOR shall power sweep existing shoulder to remove debris and loose material.

2. Apply two (2) applications of tack coat at a rate of 0.4 gallons per square yard for each application.

3. Immediately following second application of bituminous treatment, the CONTRACTOR shall apply aggregate at a rate of 20-30 pounds per square yard.

4. Aggregate shall be thoroughly rolled and broomed until a smooth surface is provided.

5. Color of newly applied aggregate shall be the same as the existing material.

6. Applicable sections of NYSDOTSS Section 410 shall be followed in shoulder resurfacing.

7. All materials, handling and replacement thereof are subject to the ECHD for county roads and other agencies of jurisdiction.

B. Paved and Gravel Stabilized Shoulder Replacement:

1. For placement of paved and gravel-stabilized shoulders, the CONTRACTOR shall backfill pipe trench with compacted select backfill material as specified under Section 02351.

2. For replacement of shoulders at a later date, the select backfill material shall be installed to an elevation matching the existing shoulder elevation.

3. For replacement of shoulders, the CONTRACTOR shall remove excess select fill material to an elevation that will allow the shoulder material to be placed to match existing shoulder section.

4. Shoulder replacement for paved shoulders, along county or town roads shall be 3 inches of Type 3 Binder and 1 inch of Type 7F, Top Course.

5. For paved shoulders, the minimum compacted thickness shall be 4 inches.

6. Stabilized gravel type shoulder replacement shall conform to the applicable portion of the NYSDOT standard specifications Section 411.

7. Any damage to pavement or shoulders of state, county or town roads shall be restored in accordance with these Specifications, NYSDOT standard specifications and the agency of jurisdiction.

8. Minimum shoulder replacement area shall extend 2 feet beyond the edge of the pipe trench when the pipe trench is within the limits of the existing shoulder or shall be a minimum of 18 inches when the existing shoulder has been damaged during construction operations and requires replacement.

3.5 DEMOLITION

A. Existing pavement shall be removed and replaced by the CONTRACTOR as required to complete the work under this Contract. CONTRACTOR shall bear the cost for pavement replacement and relocations of all utilities (above and below ground), poles, fences, pipelines, sidewalk, and curb replacement, etc., as necessary to complete the Work.

END OF SECTION

SECTION 02732

SITE SANITARY SEWERAGE SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Gravity flow sanitary sewers, fittings, accessories, materials and installation.

B. Connection of building sanitary sewer (supernatant) line to structures and existing piping.

C. Tests and inspections.

D. Pipe schedule.

1.2 RELATED SECTIONS

A. Section 01310 – Project Coordination

B. Section 01331 – Shop Drawings Procedures

C. Section 01520 – Temporary Construction Facilities

D. Section 01562 – Protection Of Work and Property

E. Section 01563 – Temporary Controls

F. Section 01780 – Record Documents

G. Section 02205 - Protection Of Existing Facilities

H. Section 02351 – Excavation, Backfill and Trenching

I. Section 03480 – Precast Concrete Vaults and Chambers

1.3 REFERENCES

A. Plastic Gravity Sewer Pipe:

1. ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings

2. ASTM F789 - Type PS-46 Poly (Vinyl Chloride) (PVC) Plastic Gravity Flow Sewer Pipe and Fittings

3. ASTM F679 - Type Poly (Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings

4. ASTM F794 - Poly (Vinyl Chloride) (PVC) Large Diameter Ribbed Gravity Sewer Pipe and Fittings

5. ASTM F894 - Polyethylene (PE) Large Diameter Profile Wall (spiral wound) Sewer and Drain Pipe

6. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe

7. ANSI/ASTM D1248 - High Density Black Polyethylene Pipe

8. ASTM D3212 - Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

9. ASTM D2412 - External Loading Properties of Plastic Pipe by Parallel-Plate Loading

1.4 SUBMITTALS

A. Submit under provisions of Section 01331.

B. Product Data - Provide data indicating conformance to ASTM/AWWA codes, pipe material, sizes, class, dimensions, joint type and accessories.

C. Manufacturer's Installation Instructions - Indicate special procedures required to install products specified.

D. Results of shop tests, if required.

E. Manufacturer's Certificate - Certify that products meet or exceed specified requirements.

1.5 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01780.

B. Submit marked-up record contract drawings, including location and length of sewer sections, service connection stationing from downstream manhole, service lateral length and depth at property line, manholes, and rim and invert elevations where the pipe enters or exits a structure. Mark up detail drawings to indicate as-built conditions.

C. Identify and locate (horizontally and vertically) on record drawings during the discovery of exposed uncharted existing utilities and services.

1.6 REGULATORY REQUIREMENTS

A. Conform to the requirements of regulatory agencies having jurisdiction over the Work.

1.7 FIELD MEASUREMENTS

A. Prior to start of construction, verify the field measurements and elevations that existing conditions and structures are as shown on Drawings. Notify ENGINEER of specific differences.

B. Prior to start of construction, verify by exploratory excavations that existing underground utility locations and elevations are as shown on Drawings or to confirm marked location and elevation of underground utilities by the organization identified in Section 02205. Notify ENGINEER of potential interference and allow ENGINEER sufficient time to determine any changes required as a result of such interferences.

C. Location and elevation of existing utilities shall be confirmed by exploratory excavation prior to installation of crossing sewer service laterals. If required, grade of lateral to be adjusted as approved by the ENGINEER.

1.8 COORDINATION

A. Coordinate work under provisions of Sections 01310 and 01520, including field engineering.

B. Coordinate work with local utility companies (private and municipal), including the organization identified in Section 02205 for location of existing utilities and protection thereof.

C. Coordinate the work with OWNER where effecting operation of existing structures, pumping stations, and treatment facilities.

PART 2 PRODUCTS

2.1 GRAVITY SANITARY SEWER PIPE MATERIALS

A. PVC Plastic Pipe

1. PVC Plastic Pipe and fittings with integral wall bell-and-spigot joints shall adhere to ASTM D3034 for Type PSM PVC sewer pipe and fittings standard dimension ratio (SDR) 35, or ASTM F789.
2. The pipe shall be joined with an integral bell, bell-and-spigot type rubber gasketed joint. Rubber gasket shall conform to ASTM F477. The rubber gasket shall be compressed radially on the pipe spigot to from a watertight seal in accordance with ASTM D3212.
3. Fittings shall be made of PVC having a cell classification of 12454B or 12454C or as defined in ASTM D1784. Fabricated fittings with solvent-cemented components shall be made in accordance with ASTM D2412 and taking cognizance of ASTM F402.
4. Pipe stiffness at 5 percent deflection shall be 46 psi for all pipe diameters when tested in accordance with ASTM D2412.
5. PVC fittings shall be SDR 35, ASTM D3034.

2.2 PIPE ACCESSORIES

A. Fittings - Same size, material and class as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, couplings, adopters, traps and other configurations required.

B. Pipe Connections:

1. Male End of New Sewer Pipe to Female End of Existing Pipe - Fernco Donuts by General Engineering Company; Pomona Pipe Products; or equal.

2. Male End of New Sewer Pipe to Male End of Existing Pipe - Fernco Flexible Couplings with Series 300 stainless steel pipe clamps; Dresser Model 360 “All-Around” Pipe Repair Clamps in Stainless Steel; or equal.

3. Pipe Connection Table - When connecting dissimilar pipe materials or when connecting new pipe to existing pipe, the following connections shall be used:

Type to Type	Solvent Cement Socket Coupling	SDR 35 to Schedule 40 (GSX/SXS)	PVC Gasketed Repair Sleeve	Cast Coupling	Rubber Adapter With Shear Ring	Repair Clamp
Sch 40 to Sch 40	✓					✓
Sch 40 to SDR 35		✓				
Sch 80 to Sch. 80	✓					✓
Sch 40, 80, or SDR 35 to DIP/CIP				✓		✓
Sch 40, 80, or SDR 35 to clay					✓	
Sch 40, 80, or SDR 35 to asbestos cement				✓		
DIP/CIP to clay					✓	
Asbestos cement to clay					✓	
SDR 35 to SDR 35			✓			
DIP/CIP to DIP/CIP				✓		✓
Clay to clay					✓	
Asbestos cement to CIP/DIP				✓		

C. Identification - Each pipe length and fitting shall be clearly marked with:
   1. Manufacturer's name and trademark.
   2. Nominal pipe size and class.
   3. Material designation.

D. Connections to Manholes - Provide rubber boot-type connectors with all stainless steel hardware as manufactured by Kor-N-Seal by NPC, Inc. or equal, around exterior of PVC or polyethylene pipe as shown on the Contract Drawings.

Provide manhole adapters as manufactured by Fernco, General Engineering, CertainTeed, or equal.

2.3 SHOP TESTS

A. General
   1. All shop tests of pipe and pipe materials required by this section and/or the applicable ASTM/AWWA Specifications shall be performed at the CONTRACTOR's expense.
   2. No specific shop tests are required for sanitary sewer piping as specified within this specification section.
   3. When no specific shop tests are required, the manufacturer shall submit a performance affidavit certifying his product meets or exceed these specifications and the applicable ANSI/ASTM and AWWA requirements. If required by the ENGINEER, certified test reports of prior tests shall be submitted with the performance affidavit.
   4. The CONTRACTOR shall submit to the ENGINEER the name or names of the proposed manufacturers of pipe for this project, including shop drawings of the proposed pipe and appurtenances.

5. Any section or lot of pipe, fittings or specials which does not meet the requirements of these specifications and the applicable ASTM/ANSI or AWWA Specifications under which the product is required to be manufactured, will be rejected.

PART 3 EXECUTION

3.1 EXAMINATION

A. The drawings and specifications may contain information relating to conditions below the ground surface at the site of proposed work, but such information is furnished without guarantee as to it being complete or correct. The CONTRACTOR shall assume all risk and responsibilities and shall complete the work in whatever manner and under whatever conditions he may encounter or create without extra cost to the OWNER. Location of existing underground facilities at or contiguous to the site is based upon information and data furnished to the ENGINEER by owners of such underground facilities or others, and OWNER and ENGINEER do not assume responsibility for the accuracy or completeness thereof.

The CONTRACTOR shall perform exploratory excavations in advance of this work to verify the location, depth, size, and material of existing utilities, which may interfere with the work to be performed under this contract. All damage to existing utilities shall be the CONTRACTOR's cost to repair or replace.

B. Verify that trench cut, excavated base and pipe bedding is ready to receive work and pipe bedding dimensions and elevations are as indicated on Drawings.

C. All pipe, fittings, and specials shall be carefully inspected in the field before lowering into the trench. Cracked, broken, warped, out-of-round, damaged joints, including damaged pipe linings or coatings, or otherwise defective pipe, fittings or specials, as determined by the ENGINEER, shall be culled out and not installed. Such rejected pipe shall be clearly tagged in such manner as not to deface or damage it, and the pipe shall then be removed from the job site by the CONTRACTOR at his own expense.

D. Any pipe showing a distinct crack with no evidence of incipient fracture beyond the limits of the visible crack, if approved, may have the cracked portion cut off by, and at the expense of, the CONTRACTOR before the pipe is laid so that the pipe used is perfectly sound and will form an approved joint. The cut shall be made in the sound barrel at a point at least 12 inches from the visible limits of the crack.

E. If authorized, cutting of the pipe shall be done in a neat and workmanlike manner without damage to the pipe lining. All pipe cutting shall be done by means of an approved type of power cutter and in accordance with manufacturer's instructions. The use of hammer and chisel, or any other method which results in rough edges, chipped or damaged pipe, is prohibited.

3.2 PREPARATION

A. The CONTRACTOR shall have on the job site with each pipe laying crew, all the proper tools, gauges, pipe cutters, lubricants, etc., to handle and cut pipe for pipe laying and for joining of the pipe.

B. Prior to installing the foundation, trenches shall have all water moved and all work performed in a dry trench.

C. All pipes, fittings or specials, which are to be installed in the open trench excavation, shall be properly bedded in, and uniformly supported on pipe foundations of the various types specified in Section 02351 and shown on the Contract Drawings.

D. Flat-bottom trenches of required width shall be excavated to the necessary depth as required and maintained in accordance with Section 02351.

E. Bedding material shall be prepared in accordance with Section 02351.

F. Suitable holes or depressions shall be provided in the pipe bedding to permit adequate bedding of bells, couplings or similar pipe projections.

G. The CONTRACTOR shall perform his bedding operations with care to maintain line and grade.

3.3 LINES AND GRADES

A. The CONTRACTOR shall furnish all labor, materials, surveying instruments, and tools to establish and maintain all lines and grades. The CONTRACTOR shall have personnel on duty or on standby call, at all times, who are qualified to set and check grades of sewers and manholes as they are installed.

B. Approximate manhole locations are shown on the Drawings.

C. The CONTRACTOR shall use this information to set line and use laser equipment to set line and grade. The CONTRACTOR shall check the grade of pipe by use of level instrument and rod at not more than 50-foot intervals.

D. The use of string levels, hand levels, carpenter's levels or other crude devices for transferring grade or setting pipe are not permitted.

E. During construction, the CONTRACTOR shall provide the ENGINEER, when requested, all reasonable and necessary materials, opportunities, and assistance for setting stakes and making measurements, including the furnishing of one or two rodmen or chainmen as needed at intermittent times.

F. The CONTRACTOR shall carefully preserve bench marks, reference points and stakes, established by the ENGINEER or OWNER, and in case of willful or careless destruction by his own operations he will be charged with the resulting expense to re-establish such destroyed control data and shall be responsible for any mistakes or delay that may be caused by the unnecessary loss or disturbance of such control data.

3.4 TOLERANCES

A. Pipes shall be laid to the lines and grades shown on the Drawings.

B. Pipes shall be straight between manholes or between points of connection to structures or existing pipes.

C. The grade of the sewer between manholes and from pipe length to pipe length shall not vary from the design grade shown on the Contract Drawings by more than 0.15 times the design grade, unless a change in grade has been ordered by the ENGINEER, in which case the same tolerance shall apply.

D. Invert elevations at any location shall not vary from the design elevations by more than 0.05 feet, unless a change in invert elevation has been ordered by the ENGINEER, in which case the same tolerance shall apply.

E. Any sewer grade or invert elevation which exceeds these tolerances shall be corrected by the CONTRACTOR at his own expense in a manner prescribed, and to the extent ordered, by the ENGINEER.

3.5 INSTALLATION

A. The CONTRACTOR shall furnish slings, straps, and/or approved devices to provide satisfactory support of the pipe when it is lifted. Transportation from storage areas to the trench shall be restricted to operations, which can cause no damaged to the pipe or lining or castings.

B. The pipe shall not be dropped from trucks onto the ground or into the trench.

C. Pipe laying shall proceed upgrade with spigot ends pointing in the direction of flow.

D. Each pipe section shall be placed into position in the trench on the pipe bedding in such a manner and by such means required to cause no injury to the pipe, persons, or to any property.

E. Pipe sizes up to and including 18-inch O.D. shall be installed so that a pipe joint occurs not more than 2 feet from the outside face of the wall of manholes or structures.

F. The pipe fittings and specials shall be firmly bedded in the pipe foundation so that the pipe barrel is uniformly supported and graded throughout its length.

G. Blocking will not be permitted under the pipe, except where the pipe is to be installed in concrete encasement or concrete cradle.

H. Holes and depressions in the pipe foundation shall be provided to receive bells, couplings, or similar projections to assure proper bedding of the pipe barrel.

I. When the pipe is in proper position, it shall be joined or coupled to the mating end of the previously laid pipe, using the required joint and, the manufacturer's recommended assembly procedure. For reinforced concrete pipe connections with gasket-type joint, coat the rubber gasket with recommended lubricant and snap into place in a groove provided at the spigot end. Before the joint is shoved home, fill the outer joint space with a continuous loop of polyurethane foam and unhydrated Portland cement or Butyl mastic recommended by manufacturer. When the joint is shoved home, the material should be squeezed firmly against the shoulder of the spigot to completely fill and seal the outer joint space.

J. After the pipe has been joined, the pipe bedding material to be placed and spread in maximum 8-inch layers to the midpoint of the pipe.

K. Each layer shall be according to the requirements of Section 02351.

L. If inspection of the pipe indicates that the pipe has been properly installed as determined by the ENGINEER, the CONTRACTOR may then continue to spread the pipe foundation material to 12 inches over the top of the pipe.

M. The pipe foundation above the midpoint of the pipe shall be spread and compacted in 12-inch layers to 12 inches above the top of the pipe.

N. When PVC or polyethylene pipe is used, do not compact directly over pipe until the depth of backfill has reached 2 feet above the top of the pipe.

O. After completing the pipe foundation to 12 inches above the top of pipe the CONTRACTOR may then backfill the remainder of the trench in accordance with Section 02351 and the typical trench details shown on the Contract Drawings.

P. At the end of each day's work or at intervals of length at the option of the ENGINEER, the ENGINEER, with the CONTRACTOR, will check the grade and inspect the pipe for alignment with lamps or mirrors. Defective work shall be dug up and reinstalled to the satisfaction of the ENGINEER.

Q. The completed assembly of pipe sections shall form a sewer with uniform slope.

R. Manufactured pipe plugs or temporary bulkheads shall be placed in the open ends of sewer lines whenever pipe laying is stopped overnight, over weekends, or whenever dirt or debris could enter the pipeline during construction.

S. Except where direct replacement of existing sewers is required, no connections to existing live sewers or laterals shall be made until the leakage test and all other requirements are met and connections approved by the Owner.

T. Install magnetic marking tape, 2 inches wide, with the words "Sanitary Sewer Below" not more than 2 feet below finished grade.

3.6 CONNECTION TO EXISTING STRUCTURES

A. Where sewers are to be connected to existing manholes, or other structures, and where no stub or opening has been provided for the connection, the CONTRACTOR shall cut an opening of minimum diameter through the side wall of the structure for inserting the pipe, at the required location.

B. In making connections to existing manholes or structures, care shall be taken to avoid damage to the manhole or structure or allowing debris to enter the pipelines. Any damage resulting from the CONTRACTOR's operations shall be repaired and made good by the CONTRACTOR at his own expense.

C. After inserting the pipe, the annular space remaining outside the pipe shall be completely filled with an expanding joint sealer (activated oakum or compressed foam) and covered with non-shrinking watertight mortar and such joint made watertight so that leakage of water into the structure is prevented.

D. The pipe shall be positioned so that the finished or trimmed end of the pipe is flush with the inside wall surface of the structure. The mortar filler shall be struck off neatly to form a smooth, dense surface flush with the inside wall surface of the structure.

E. For PVC, plastic or polyethylene pipe, furnish and install a rubber joint waterstop ring around exterior of pipe or provide a manhole adaptor to make a watertight manhole connection as manufactured by Fernco Type "CMA" adaptor, The General Engineering Co. Type "CT" adaptor, Certain-teed, Johns-Manville, or equal.

F. Benchwalls in existing structures shall be altered to form a new trough so the new connection will enter the existing flow channel at a 45-degree angle in the direction of flow.

G. Benchwalls to be extended upwards to the top of pipes as shown on the Contract Drawings.

H. Existing flow to be maintained through manhole or by bypass pumping or piping.

3.7 TESTING

A. All installed sanitary sewer pipe and structures shall be subject to air, leakage, infiltration/exfiltration, and alignment testing.

3.8 CLEANING PIPELINE

A. At the conclusion of the work, the CONTRACTOR shall thoroughly clean all new pipes by flushing with water or other means to remove all dirt, stones, pieces of wood, etc., which may have entered during the construction period.
   1. Pipes shall be flushed at a minimum rate of 2.5 feet per second for a suitable duration.
   2. If after this cleaning, any obstructions remain, they shall be corrected to the satisfaction of the ENGINEER.

B. Where required, the CONTRACTOR shall use mechanical methods to clean pipes when flushing does not remove all obstructions or material.

3.9 FINAL INSPECTION

A. Each section of installed sewer between manholes, or structures will be inspected by the ENGINEER before final acceptance. Such inspection will be visual by traversing the inside of the pipe, or by sighting through the line from manhole to manhole with the aid of artificial light when the pipe is too small to be entered.

B. The pipe and fittings shall be true to both line and grade, shall show no leaks, shall show no obstruction to flow, shall have no projections of connecting pipe into the line, shall be free from cracks and protruding joint materials, and shall contain no deposits of dirt, debris or other material which will in any way reduce the full cross sectional area of the pipe.

C. Any section of sewer or drain, or portions thereof, which do not comply with the inspection criteria defined above, shall be promptly corrected or repaired by the CONTRACTOR at his own expense.

D. Pipe, which is cracked or collapsed, shall be dug up and replaced with new pipe; pipe, which is out of line or grade, shall be dug up and relaid to the correct line and grade.

E. Connecting pipes, which protrude into the line, shall be re-excavated and the connection remade, or the protruding portion of the connecting pipe shall be trimmed back flush with the wall of the main sewer, if the main line can be entered.

F. Deposits of dirt and debris shall be flushed with water through to the downstream manhole and removed.

G. At points of leakage, the pipe shall be dug up and replaced or repaired with approved repair clamp couplings (stainless steel Type 304 with stainless steel bolts and nuts or cast iron coupling with stainless steel bolts and nuts) so as to permanently stop the leak in a manner which shall receive the prior approval of the ENGINEER.

H. All manholes shall be watertight. All joints between precast wall sections, between cast iron frame and brick, and between brick units themselves shall be neat, continuous, and flush with the adjacent surfaces. Dirt and debris shall be removed from all manholes.

3.10 PIPE SCHEDULE

LOCATION	SIZE (INCHES)	APPROXIMATE LENGTH (FEET)	TYPE OF PIPE	SCHEDULE OR CLASS OF PIPE	TYPE OF PIPE JOINT	SHOP TEST REQUIRED	REMARKS
Connection of new sanitary line to new septic tank	4”	In accordance with Contract Drawings	PVC	SDR-35	Push-on	No	No alternate pipe material
Connection of new septic tank to existing leach field	4”	In accordance with Contract Drawings	PVC	SDR-35	Push-on	No	No alternate pipe material

END OF SECTION

SECTION 02831

CHAIN LINK FENCE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. CONTRACTOR shall furnish all labor, materials, equipment and incidentals required to provide all fencing.

B. The types of fencing and appurtenances include the following:

1. Aluminum coated, steel chain link fabric.

2. Galvanized steel framework.

3. Auxiliary system components, gates, accessories, fasteners and fittings.

1.2 RELATED SECTIONS

A. Section 03300 – Cast in Place Concrete

1.3 REFERENCES

A. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:

1. ASTM A 120, Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe of Ordinary Uses.

2. ASTM A 121, Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.

3. ASTM A 153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

4. ASTM A 392, Specification for Zinc-Coated Steel Chain-Link Fence Fabric.

5. ASTM C 33, Specification for Concrete Aggregates.

6. ASTM C 150, Specification for Portland Cement.

7. Chain Link Fence Manufacturer's Institute, Galvanized Steel Chain-Link Fence Fabric.

1.4 QUALITY ASSURANCE

A. Erector Qualifications: Engage a single erector skilled, trained and with successful and documented experience in the installation of fencing, who is acceptable to the fencing manufacturer, and with specific skill and successful experience in the erection of the types of components required; and who agrees to employ only tradesmen with specific skill and successful experience in this type of Work. Submit names and qualifications to ENGINEER along with the following information on a minimum of three successful projects:

1. Names and telephone numbers of owners, architects or engineers responsible for projects.

2. Approximate contract cost of the fencing.

3. Amount of area installed.

B. Design Criteria: Comply with the standards of the Chain Link Fence Manufacturer's Institute for "Galvanized Steel Chain Link Fence Fabric" and Federal Specification RR-F-191/1C, unless otherwise shown or specified.

C. Source Quality Control

1. Provide chain link fence as a complete unit produced by a single manufacturer, including necessary erection accessories, fittings and fastenings as may be necessary or required.

2. Provide fence fabric imprinted with manufacturer's trade name, country of origin, core wire gauge, and finished outside diameter gauge.

3. Provide shipping list for materials used, endorsed with the manufacturer's voucher certifying that the material used in the fencing complies with these Specifications and with specific selections made on approved Shop Drawings.

4. Structural shapes of satisfactory sections and equal strengths may be substituted if approved by ENGINEER.

D. Performance Criteria

1. Comply with the standards of the Chain Link Fence Manufacturer's Institute for product and installation requirements and the requirements of ASTM F 567. These standards shall represent a minimum level of quality when additional information is not shown or specified in the Contract Documents.

2. Where proposed fencing framework or other structural components varies from Contract Documents, the fabricator shall provide structural calculations for the design of the proposed fencing to CONTRACTOR for submittal to ENGINEER as part of Shop Drawing review. Structural analysis shall verify that all system components including, but not limited to, supports, gates, fasteners, fittings and connections meet the requirements of governing authorities having jurisdiction at the Site. Such modifications shall be incorporated into the Work only as acceptable to ENGINEER.

3. Verify size of framing members shown or specified, and submit with Shop Drawings. Member sizes, thicknesses and weights shown or specified shall be considered minimum. Where structural analysis indicates, provide additional members, or increased member size, thickness or weight.

4. Modifications may be made only as necessary to meet Site conditions to provide proper fitting and support of the Work and only upon submittal of Shop Drawings and receipt of approval by ENGINEER.

5. Furnish weights of zinc and aluminum coatings on wire and pipe fabrications, in compliance with CLF 2445.

E. Fabrication Tolerances

1. Fabric, posts, rails, and other supports shall be straight or uniformly curved to provide the profiles shown, to a dimensional tolerance of 1/16-inch in 10 feet - 0 inches without warp or rack in the finished installation.

1.5 SUBMITTALS

A. Qualifications Data:

1. Submit qualifications data for the Erector.

B. Samples: Submit the following:

1. Each fencing component, fastener, post, rail, support, chain-link fabric and other auxiliary and miscellaneous items labeled with identification as to use and location.

2. Each chain-link fabric material, 6-inches square; and framework members, and typical accessories, each approximately 6-inches long.

3. Full range of manufacturer's standard and custom colors.

4. ENGINEER's review will be for color and texture only. Compliance with all other requirements is the responsibility of CONTRACTOR.

C. Shop Drawings: Submit the following:

1. Copies of manufacturer’s technical product information, specifications and installation instructions for all fencing components, and auxiliary system components such as gate operators and motors.

2. All structural calculations verifying that all system components comply with the requirements of governing authorities having jurisdiction at the Site.

3. Large scale details drawn at a scale of 3-inches equals one foot for all connections and gate details, including motor mounting arrangements.

4. A list of all hardware, fasteners and accessories.

5. Weight of aluminum coating on wire fabrications in compliance with ASTM A 428.

6. Weight of zinc coating on pipe fabrications in compliance with ASTM A 90.

7. Provide certification that overhead gate is compliant with ASTM F 2200, Standard Specification for Automated Vehicular Gate Construction

1.5 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by OWNER or others, unless permitted under the following conditions, and then only after arranging to provide temporary utility services according to requirements indicated.

B. Notify ENGINEER not less than 10 days in advance of proposed utility interruptions.

C. Do not proceed with utility interruptions without ENGINEER’s written permission.

D. Site-Measurements: Take measurements at the Site and verify layout information and dimensions for fencing and gates in relation to property surveys and existing conditions.

E. Do not begin installation and erection of the fencing until final grading is completed.

PART 2 PRODUCTS

2.1 GENERAL

A. Pipe sizes specified are commercial pipe sizes.

B. Tube sizes specified are nominal outside dimension.

C. Roll-formed section sizes are the nominal outside dimensions.

D. Wire gauges shall conform to American Steel and Wire Company gage.

E. Heat-form all arcs and chords before protective coatings are applied to metal.

F. All sizes specified are given for uncoated metal. All protective coatings are in addition to specified metal dimensions, gages and sizes.

G. Finish for framework, fabric, appurtenances, etc. Furnish the following finishes for fencing materials:

1. Material as specified for each component hereafter described.

2.2 FABRIC

A. Furnish chain link fabric as follows:

1. One-piece fabric widths, for fence heights up to 12 feet, complying with CLFMI product requirements.

2. Wire mesh shall be woven throughout in the form of approximately uniform square mesh with parallel sides and horizontal and vertical diagonals of approximately uniform dimensions, of size and gage specified and in compliance with ASTM A 817, Type 1, cold-drawn carbon steel wire with minimum breaking strength of 2,170 pounds and coated with aluminized finish, as specified. Fabric shall be recommended by the Chain Link Fence Manufacturer's Institute for heavy industrial usage.

3. Provide fabric knuckled to eliminate exposure of sharp edges.

4. Fabric Gage: Provide the following:

a. For High Security Fence: No. 9-gage wires.

5. Mesh Size: Provide the following:

a. For High Security Fence: 1-inch mesh.

1.3 FRAMEWORK

A. General: the following table is provided for the convenience of CONTRACTOR and provides actual OD and equivalent nominal NPS size and trade size of round members.

Actual OD	NPS Size	Trade Size
1.315	1	1-3/8
1.660	1-1/4	1-5/8
1.900	1-1/2	2
2.375	2	2-1/2
2.875	2-1/2	3
3.500	3	3-1/2
4.000	3-1/2	4
6.625	6	6-5/8
8.625	8	8-5/8

B. Pipe shall be commercial grade, plain end steel pipe with standard weight walls. Steel strip used in the manufacture of pipe shall be in compliance with ASTM F 1083, Schedule 40 pipe with minimum yield strength of 25,000 pounds per square inch and protected with zinc, as specified.

C. End, Corner, and Pull Posts: Provide end, corner, and pull posts of minimum sizes as follows:

1. Over six feet fabric height:
   a. 2.875-inches OD pipe weighing 4.64-pounds per linear foot.

D. Line Posts: Provide line posts of the minimum sizes and weights as follows:

1. Over six feet fabric height:
   a. 2.375-inches OD pipe; weight of 3.12-pounds per linear foot.

E. Gate Posts: Furnish gate posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows:

1. Over 13 feet wide:
   a. 6 5/8-inches OD pipe weighing 18.99-pounds per linear foot.

F. Top and Bottom Rails: Provide top and bottom rails, unless otherwise shown, conforming to the following:

1. Over six feet fabric height:
   a. 1.66-inch OD top rail weighing 2.27 pounds per linear foot.

2. Provide in manufacturer's longest lengths, with expansion type coupling 1.051-inch thick rail sleeves, approximately 7 inches long, for each joint.

3. Provide means for attaching the top rail securely to each gate, corner, pull and end post.

G. Center Rails Between Line Posts: Provide center rails between line posts, where shown, consisting of 1.660-inch OD pipe weighing 1.84-pounds per linear foot.

H. Roll-Formed Steel: Provide rolled steel shapes produced from structural-quality steel conforming to ASTM A 570, Grade 45, with a minimum yield strength of 45,000 pounds per square inch. Protective coating system shall conform to ASTM F 1043, as specified.

1.4 SWING GATES

A. Swing gates shall comply with ASTM F 900.

B. Gate hinges shall be of the double clamping offset type. To hold the gate in the open or closed positions, provide each gate frame with a keeper that automatically engages a gate shoe set in concrete. Gates shall have a drop latch with provision for a padlock.

1. Gate Hinges: Pressed or forged steel or malleable iron to suit gate size, non-lift-off type, 180 degree offset heavy-industrial hinges; 1-1/2 pair per leaf.

2. Latch: Forked-type or plunger bar type to permit operation from either side of gate, with padlock eye as integral part of latch.

3. Keeper: Provide a gate keeper for vehicle gates that automatically engages gate leaf and holds it in the open position until manually released

C. Padlocks: Provide each gate with a heavy-duty bronze padlock and shackle chain as follows:

1. Product and Manufacturer: Provide one of the following:
   a. No. 160DHM with 11/32-inch marine brass shackle by the Master Lock Company.
   b. Or equal.

2. Provide three keys for each padlock. Where more than one gate is required for the same enclosure, padlocks shall be keyed the same.

D. All gate frames shall have intermediate horizontal rails. Gate frames shall be of welded construction and shall be galvanized after fabrication. Single gates 6-feet wide or wider and double gates 12-feet wide or wider shall be provided with diagonal bracing in one direction, extending from top to bottom rail.

E. Gate Stops: Provide gate stops for double gates consisting of mushroom-type flush plate with anchors, set in concrete and designed to engage a center drop rod or plunger bar. Include locking device and padlock eyes as an integral part of the latch, using one padlock for locking both gate leaves.

F. Fabricate gate perimeter frames of tubular members. Provide additional horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware and accessories. Space so that frame members are not more than eight feet apart. Fabricate as follows:

1. Over 6 feet high, or leaf width exceeding 8 feet:
   a. 1.900-inch O.D. pipe weighing 2.72-pounds per linear foot.

G. Assemble gate frames by welding or with special malleable or pressed steel fittings and rivets for rigid connections. Use same fabric as for the fence. Install fabric with stretcher bars at vertical edges. Bars may also be used at top and bottom edges. Attach stretchers to gate frame at not more than 15-inches on center. Attach hardware with rivets or by other means, which will provide security against removal or breakage.

H. Install diagonal cross bracing on gates consisting of 1/2 inch diameter adjustable length truss rods provided with turnbuckles to ensure frame rigidity without sag or twist.

1.5 OVERHEAD SLIDE GATES

A. Provide clear opening width of 24 feet and clear opening height of 16 feet.

B. Gate Frame:

1. The gate frame shall be fabricated from 6063-T6 aluminum alloy extrusions. The top member shall be a 3" x 5" aluminum structural channel/tube extrusion weighing not less than 3.0 lb/lf. The bottom member shall be a 2" x 5" aluminum structural tube weighing not less than 2.0 lb/lf.

2. Vertical Members: The vertical members at the ends of the opening portion of the frame shall be "P" shaped in cross section with a nominal base dimension of no less than 2" x 2" and weighing not less than 1.6 lb/lf. The intermediate vertical members shall alternate between 2" x 2" and 1" x 2" in cross section weighing not less than 1.1 lb/lf and 0.82 lb/lf respectively. The spacing for the vertical intermediates shall be less than 50% of the gate frame height.

3. Provide 3'-0" by 4'-0" tail for mounting of automatic gate operator.

4. All welds on the gate frame shall conform to Welding Procedure Specification and Procedure Qualification Record to insure conformance to the AWS D1.2 Structural Welding Code. All individual welders shall be certified to AWS D1.2 welding code.

C. Gate Track: The separate semi-enclosed overhead track, extruded from 6005A-T61 or 6105-T5 aluminum alloy, shall weigh a minimum of 2.7 lb/lf. Aluminum overhead track shall be bolted to the "W" beam by means of 1/2" diameter bolts at intervals not exceeding 2'-0".

D. Gate Mounting:

1. The gate frame is to be supported from the track by two (2) swivel type, self-aligning, four wheeled, sealed lubricant, ball-bearing truck assemblies.

2. The bottom of each support post shall have a bracket equipped with a 3" (76mm) UHMW guide wheel. Wheel cover protectors shall be included with bottom guides to comply with UL325.

3. For added wind resistance each of four (4) intermediate posts shall support a pair of 3" (76mm) UHMW intermediate bottom guide wheels.

4. Gap protectors shall be provided and installed, compliant with ASTM F 2200.

E. Posts: Overhead slide gates are to be hung from three sets of 4" O.D. (102mm) round SS40 galvanized steel posts. A 3" x 3" x 3/16" steel angle shall be welded between them to support the "I" or "W" galvanized beam. The "I" or "W" beams shall extend for a distance approximately twice the width of the gate.

F. Diagonal Bracing: Diagonal "X" bracing of 3/16" or 1/4" diameter stainless or galvanized steel cable shall be installed throughout the entire gate frame.

G. The gate shall be completed by installation of approved filler fabric as specified

H. Finish: mill finish aluminum.

I. Gate Operator:

1. Provide heavy duty gate operator with integral 24 VDC control module, three button control station, receiver, and manual disconnect. Operator shall be compatible with access control reader system (control reader provided by others).

2. Provide conduit between gate operator and pump station building as noted on drawings. Mount operator in accordance with manufacturer's requirements. Power and control wiring and installation to be provided by others.

3. Voltage: 460 VAC, three-phase.

4. Motor horsepower shall be sized based on gate length and weight. Minimum 1 HP.

5. Gate opening speed: minimum 10 inches per second.

6. Gate operator shall be Linear Model HSLG or equal.

1.6 AUXILIARY FENCING MATERIALS AND ACCESSORIES

A. Wire Ties:

1. For tying fabric to line posts, use 9-gage, aluminum alloy 1100-H4, polyvinyl chloride coated wire ties to match fence fabric, spaced 12 inches on center.

2. For tying fabric to rails and braces, use 9-gage, aluminum alloy 1100-H4, polyvinyl chloride coated wire ties to match fence fabric, spaced 24 inches on center.

3. For tying fabric to tension wire, use 11-gage, aluminum alloy 1100-H4, polyvinyl chloride coated wire hog ring ties to match fence fabric, spaced 24 inches on center.

B. Tension Wire: Provide tension wire consisting of aluminized, 7-gage, coiled spring steel wire coated with 0.40-ounces of aluminum per square foot of wire surface, minimum; in compliance with ASTM F 1664.

1. Locate at bottom and top of fabric.

C. Barbed Wire Supporting Arms: Pressed steel for three rows of barbed wire attached to each arm, complete with provisions for anchorage to posts. Supporting arms shall be integral with post top weather cap. Provide following type:

1. Vee-type with two arms, each at 45 degrees to vertical, one set for each post.

D. Barbed Wire: Commercial quality steel, two strand, 12.5-gauge line twisted line wire with 4-point barbs spaced 5-inches on center, as follows:

1. Galvanized Coated, complying with ASTM A-121, Type Z – zinc coated wire.

E. Post Caps: Pressed steel, wrought iron, or cast aluminum alloy, designed as a weather tight closure cap, for tubular posts. Provide one cap for each post unless equal protection is afforded by combination post top cap and barbed wire supporting arm, where barbed wire is required.

1. Provide caps with openings to permit through passage of the top rail.

2. Provide cone-type caps for terminal posts and loop-type caps for line posts.

F. Stretcher Bars: One-piece lengths equal to full height of fabric, with a minimum cross-section of 3/16-inch by 3/4-inch. Provide one stretcher bar for each gate and end post, and two for each corner and pull post, except where fabric is integrally woven into the post.

G. Stretcher Bar Bands: Pressed steel, galvanized, 0.078-inches to 0.108-inches thick depending on post diameter, spaced not over 15 inches on center to secure stretcher bars to end, corner, pull, and gate posts.

1. Bands may also be used with special fittings for securing rails to end, corner, pull and gate posts.

H. Truss Rods: Steel rods, 3/8-inch diameter, merchant quality with turnbuckle.

I. Concrete: Refer to Section 03300, Cast-In-Place Concrete.

1.7 FINISHES

A. Chain-Link Fence Fabric:

1. Aluminized finish with not less than 0.40-ounces aluminum per square foot, complying with ASTM A 491.

B. Framework and Appurtenances: Provide the following finishes for steel framework, auxiliary system components and miscellaneous accessories:

1. Galvanizing: Zinc for galvanizing shall be of High Grade or Special High Grade conforming to ASTM B 6 with a maximum aluminum content of 0.01 percent. Galvanize metal by the "hot-dip" process in compliance with the following standards:

Class of Work	ASTM
Structural Iron and Steel Shapes	A 123
Rolled-Form Sheet Steel.	A 653
Hardware and Accessories	A 153
Fittings……..	F 626
Pipe……..	A 53

2. Provide minimum weights of zinc as follows:

a. Pipe: 1.8-ounces of zinc per square foot. Type A coating shall be applied both inside and outside according to ASTM F 1043, as determined by ASTM A 90.

b. Rolled-Form Sheet Steel: 4.0-ounces of zinc per square foot of surface area.

c. Hardware and Accessories: Zinc weights in compliance with Table 1 of ASTM A 153.

C. Welded Joints:

1. Repair zinc coatings at welded joints by applying a zinc-rich paint, as recommended by manufacturer, Painting.

2. Repair polymer-coated steel by applying an epoxy primer, intermediate coat and a urethane topcoat, as recommended by manufacturer, Painting, matching color and reflectivity of adjacent PVC finish.

2.4 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. All faces of the fence shall display a sign bearing the words "NO TRESPASSING." Size, materials of construction, and connection details for signage shall be submitted to ENGINEER for approval.

PART 3 EXECUTION

3.1 INSPECTION

A. CONTRACTOR and his installer must examine the conditions under which the fence is to be installed and notify the ENGINEER and in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the ENGINEER.

3.2 PREPARATION

A. Do not begin fence installation and erection before the final grading is completed with finish elevations established.

3.3 INSTALLATION

A. Erect framework, fabric and accessories in accordance with ASTM F567

B. Excavation: Drill holes of diameters specified, for post footings in firm, undisturbed or compacted soil.

1. For posts set in cast-in-place concrete, provide hole diameters dug or drilled a minimum of four times the largest cross section of the post.

a. Unless otherwise indicated, excavate hole depths approximately 3-inches lower than the post bottom, with bottom of posts set not less than 24-inches below the surface of finished grade when in firm, undisturbed soil, plus an additional 3-inches for each foot increase in the fence height over four feet.

2. Spread soil from excavations uniformly adjacent to the fence line, or on adjacent areas of the Site, as directed by the ENGINEER.

3. When solid rock is encountered at the surface, drill into rock at least 12-inches for line posts and at least 18-inches for end, pull, corner, and gate posts. Drill hole at least 1-inch greater diameter than the largest dimension of the post to be placed.

a. If solid rock is below soil overburden, drill to full depth required, except penetration into rock need not exceed the minimum depths specified above.

C. Setting Posts: Remove loose and foreign materials from sides and bottoms of holes, and moisten soil prior to placing concrete.

1. Center and align posts in holes 4 inches above bottom of excavation.

2. Place concrete around posts in a continuous pour, and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.

3. Trowel finish tops of footings, and slope or dome to direct water away from posts. Extend footings for gateposts to the underside of bottom hinges. Set keeps, stops, sleeves and other accessories into concrete as required.

4. Keep exposed concrete surfaces moist for at least 7 days after placement, or cure with membrane curing materials, or other acceptable curing method.

D. Concrete Strength: Allow concrete to attain at least 75 percent of its minimum 28-day compressive strength, but in no case sooner than 7 days after placement, before rails, tension wires, or fabric is installed. Do not stretch and tension fabric and wires, and do not hang gates until the concrete has attained its full design strength.

1. Take samples and test concrete to determine strength as specified in concrete sections of Division 3.

E. Posts and Rails:

1. Line Posts: Set posts in cast-in-place concrete footings as specified, spaced not more than ten feet on centers. Install caps on tops of all posts to exclude moisture and to receive the top rail, unless equal protection is afforded by combination post top cap and barbed wire supporting arm, where barbed wire is required.

2. Top Rails: Run rail continuously through post caps or extension arms, bending to radius for curved runs. Provide expansion couplings as recommended by fencing manufacturer to form a continuous rail between terminal posts.

3. Brace Assemblies: Install braces so posts are plumb when diagonal rod are under proper tension. Install brace assemblies at end posts and at both sides of corner and pull post panels. Panels adjacent to gates shall have intermediate horizontal rails and diagonal bracing. The diagonal bracing shall run from the center of the first line post to the bottom of the terminal post.

F. Chain-Link Fabric:

1. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released. Fasten to terminal posts and gate posts with tension bars threaded through mesh and secured with tension bands at maximum intervals of 14-inches.

2. Tie to line posts, gate frames and top and bottom rails with tie wires spaced at maximum 12-inches on posts and 24-inches on rails.

3. Connect tension bars to posts and frames by means of adjustable bolts and bands spaced not more than 14-inches apart.

4. Leave approximately 2-inches between finish grade and bottom selvage, except where bottom of fabric extends into concrete.

5. Join roll of chain-link fabric by weaving a single picket into the ends of the roll to form a continuous mesh.

G. Tension Wire:

1. Stretch tension wire taut and free of sag, from end to end of each stretch of fence and position at a height that will enable the wire to be fastened to the chain-link fabric by securing within the top 12-inches of the chain-link fabric.

2. Fasten bottom tension wire within the bottom 6-inches of the chain-link fabric.

3. Tie tension wire to each post with not less than 6-gage galvanized wire.

H. Barbed Wire:

1. Install three parallel wires on each extension arm, on security side of fence, unless otherwise indicated.

2. Pull wire taut to remove all sag and firmly install in the slots of extension arms to prevent movement or displacement.

3. Secure wires to terminate L posts band arms or brace bands.

4. Extend vertical members of gates to receive the barbed wire.

I. Stretcher Bars: Thread through or clamp to fabric 4 inches on center, and secure to posts with metal bands spaced 15 inches on center.

J. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground set items in concrete for anchorage, as shown on approved Shop Drawings. Adjust hardware for smooth operation and lubricate where necessary.

K. Tie Wires: Use U-shaped wires conforming to diameter of pipe. Clasp pipe and fabric firmly with ends twisted at least two full turns. Bend ends of wire to minimize hazard to persons or clothing.

L. Fasteners: Install nuts for tension band and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.4 ADJUSTMENT AND CLEANING

A. Repair coatings damaged in the shop or during erection on-Site by recoating with manufacturer's recommended repair compound, applied in accordance with manufacturer's directions.

B. Gate: Adjust gate to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

C. Lubricate operating equipment and clean exposed surfaces.

D. Repair and replace all broken or bent components.

END OF SECTION

SECTION 02900

RESTORATION

PART 1 GENERAL

1.1 DESCRIPTION

A. Work Specified

The work specified shall include all labor, material, equipment, services, and incidentals necessary to restore surfaces, lawns, culverts, and other features disturbed, damaged, or destroyed during the performance of the work under or as a result of the operations of the Contract.

B. Related Work Specified Elsewhere

1. Section 02316 – SELECT GRANULAR MATERIALS

2. Section 02351 – EXCAVATION, BACKFILL, AND TRENCHING

1.2 QUALITY ASSURANCE

A. The quality of materials and the performance of work used in the restoration shall produce a surface or feature equal to the condition of each before the work began.

B. Reference Standards

1. American Association of Nurserymen (AAN)

2. ASTM D698, Standard Compaction Test

3. ASTM D2487, Classification of Soils for Engineering

4. ASTM D2974, Standard Test Method for Moisture, Ash and Organic Matter of Peat and Other Organic Soils

5. New York State Department of Transportation Standard Specifications, latest revision

1.3 SUBMITTALS

A. CONTRACTOR shall submit the following submittals:

1. The location of source and data for off-Site topsoil.

2. Analysis of the seed.

3. Should a hydroseeder be used, the CONTRACTOR shall submit all data including material and application rates.

1.4 SCHEDULE OF RESTORATION

A. A schedule of restoration operations shall be submitted by the CONTRACTOR for review.

1. After an accepted schedule has been agreed upon it shall be adhered to unless otherwise revised by the ENGINEER.

B. In general, permanent restoration of traveled surfaces will not be permitted until 1-month time has elapsed after excavations have been completely backfilled as specified.

C. The replacement of surfaces at any time, as scheduled or as directed, shall not relieve the CONTRACTOR of responsibility to repair damages by settlement or other failures.

PART 2 PRODUCTS

2.1 MATERIALS

A. Topsoil shall be unfrozen friable clayey loam free from clay lumps, stones, roots, sticks, stumps, brush, hazardous materials, or foreign objects.

B. Fertilizer shall be a standard quality commercial carrier of available plant food elements. A complete prepared and packaged material containing a minimum of 10 percent nitrogen, 10 percent phosphoric acid and 10 percent potash.

1. Each bag of fertilizer shall bear the manufacturer's name and guaranteed statement of analysis.

C. Seed mixtures shall be of commercial stock of the current season's crop and shall be delivered in unopened containers bearing the guaranteed analysis of the mix.

1. All seed shall meet the New York State Department of Transportation 713-04 standard specifications for germination and purity.

D. Seed Mixtures:

Specia	***Lawn Areas****	***Non-Maintained Areas ****
Kentucky Bluegrass	50	20
Creeping Red Fescue	30	20
Manahattan or Pennfine Ryegrass	20	60

* % by weight

E. Mulch shall be stalks of oats, wheat, rye or other acceptable crops, which are free from noxious weeds.

2.2 MATERIALS TESTING.

A. All materials must be tested and approved prior to delivery to the Site. Samples of materials proposed for use shall be submitted by the CONTRACTOR to the ENGINEER and the testing laboratory. Samples of the materials shall be submitted at least ten days in advance of its anticipated use.

PART 3 EXECUTION

3.1 INSTALLATION

A. Lawns and Improved Areas

1. The area to receive topsoil shall be graded to a depth of not less than 4 inches or as specified, below the proposed finished surface. If the depth of existing topsoil prior to construction was greater than 4 inches, topsoil shall be replaced to that depth.

    a. All debris and inorganic material shall be removed and the surface loosened for a depth of 2 inches prior to the placing of the topsoil.

    b. The topsoil shall not be placed until the subgrade is in suitable condition and shall be free of excessive moisture and frost.

    c. Topsoil placed in areas of earth excavation will not be placed until suitable earth compaction has been performed.

2. Satisfactory topsoil removed from the excavations shall be placed on the prepared subgrade to the depth required.

    a. In the event the topsoil removed during excavation is unsatisfactory or inadequate to obtain the required finish grades, the CONTRACTOR shall furnish the required quantity of satisfactory topsoil from specified sources off Site.

    b. All topsoil shall be free from stones, roots, sticks and other foreign substances and shall not be placed in a frozen or muddy condition.

    c. The finished surface shall conform to the lines and grades of the area before disturbed or as shown on the Contract Drawings. Any irregularities shall be corrected before the placement of fertilizer and seed.

3. The fertilizer shall be applied uniformly at the rate of 20 pounds per 1,000 square feet.

    a. Following the application of the fertilizer and prior to application of the seed, the topsoil shall be scarified to a depth of at least 2 inches with a disc or other suitable method traveling across the slope if possible.

4. When the topsoil surface has been fine graded, the seed mixture shall be uniformly applied upon the prepared surface with a mechanical spreader at a rate of not less than 5 pounds per 1,000 square feet.

    a. The seed shall be raked lightly into the surface and rolled with a light hand lawn roller.

    b. Seeding and mulching shall not be done during windy weather.

5. The mulch shall be hand or machine spread to form a continuous blanket over the seed bed, approximately 2 inches uniform thickness at loose measurement. Excessive amounts or bunching of mulch will not be permitted.

    a. Mulch shall be anchored by an acceptable method.

    b. Unless otherwise specified, mulch shall be left in place and allowed to disintegrate.

c. Any anchorage or mulch that has not disintegrated at time of first mowing shall be removed. Anchors may be removed or driven flush with ground surface.

6. Seeded areas shall be watered as often as required to obtain germination and to obtain and maintain a satisfactory sod growth. Watering shall be in such a manner as to prevent washing out of seed. Any washout or damage, which occurs, shall be regraded and reseeded until a good sod is established.

7. Hydroseeding may be accepted as an alternative method of applying fertilizer, seed and mulch. The CONTRACTOR must submit all data regarding materials and application rates to the ENGINEER for review.

8. The CONTRACTOR shall maintain the newly seeded areas, including regrading, reseeding, watering and mowing, in good condition, until the development of an established cover.

B. Cultivated Area Replacement

1. Areas of cultivated lands shall be graded to a depth to receive topsoil of not less than the depth of the topsoil before being disturbed. All debris and inorganic material shall be removed prior to placing of the topsoil.

2. After the topsoil has been placed and graded, the entire area disturbed during construction shall be cultivated to a minimum depth of 12 inches with normal farm equipment.

a. Any debris or inorganic materials appearing shall be removed.

b. The removal of stones shall be governed by the adjacent undisturbed cultivated area.

3. Grass areas shall be re-seeded using a mixture equal to that of the area before being disturbed, unless otherwise specified.

C. Other Types of Restoration

1. Shrubs and landscape items damaged or destroyed as a result of the construction operations shall be replaced in like species and size.

a. All planting and care thereof shall meet the standards of the American Association of Nurserymen.

2. Water courses shall be reshaped to the original grade and cross-section and all debris removed. Where required to prevent erosion, the bottom and sides of the watercourse shall be protected.

3. Culverts destroyed or removed as a result of the construction operations shall be replaced in like size and material and shall be replaced at the original location and grade. When there is minor damage to a culvert and with the consent of the ENGINEER, a repair may be undertaken, if satisfactory results can be obtained.

4. Should brick pavements be encountered in the work, the restoration shall be as set forth in the General Requirements or as directed.

5. Items removed for construction such as mailboxes, signposts, reflector markers, and the like shall be replaced in as good or better condition than existing. Items damaged by the CONTRACTOR shall be replaced at his expense. Privately owned items, such as mailboxes, shall be reinstalled to the satisfaction of the OWNER and ENGINEER.

D. Lawn Maintenance

1. All lawn areas shall be mowed by the CONTRACTOR before the new grass reaches a height of 4 inches.

   a. Following the establishment of a good stand of grass and the first mowing, the CONTRACTOR's obligation shall end except for the repair of settlement or damage.

2. Any lawn area, which does not develop an established cover, shall be reseeded and maintained at the CONTRACTOR's expense until an established cover is present.

E. Tree Plantings

1. Determine location of underground utilities and perform work in a manner that will avoid possible damage. Hand excavate, as required, to minimize possibility of damage to underground utilities. Maintain grade stakes until removal is mutually agreed upon by all parties concerned.

2. Trees replaced by the CONTRACTOR will be of the same species, and will be a minimum of 6 feet high and 2 inches in trunk diameter. CONTRACTOR must fertilize and water tree appropriately after planting and will guarantee tree for a period of one year. All issues regarding tree planting including type, size, and final location must be approved by the ENGINEER prior to payment.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section specifies cast-in place concrete, formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.

1.2 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Indicate amounts of mix water to be withheld for later addition at Project Site.

C. Provide the name and location of the concrete supplier.

C. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

1. Aggregates.
2. Reinforcing steel if requested by the ENGINEER.
3. Design mixes.

E. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Cementitious materials and aggregates.
2. Form materials and form-release agents.
3. Steel reinforcement and reinforcement accessories.
4. Admixtures.
5. Curing materials.
6. Floor and slab treatments.
7. Bonding agents.
8. Adhesives.
9. Joint-filler strips.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

C. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.

D. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated.

E. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

F. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

G. ACI Publications: Comply with the following, unless more stringent provisions are indicated:

1. ACI 301, "Specification for Structural Concrete."

2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.4 TESTS

A. All previous testing of non-concrete materials incorporated in the concrete mix shall be performed within the past twelve months. Make test reports available to the Engineer upon request.

B. For each day when concrete is being placed, provide at a minimum, one slump test and three cylinders for compression testing. One cylinder shall be tested at 7 days, and two (2) at 28 days. Submit all copies of test results to Engineer for review.

PART 2 PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed (exposed) Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints. Use plywood, metal, or other approved panel materials.

B. Rough-Formed (unexposed) Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4-inch minimum.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces. Formulate form-release agent with rust inhibitor for steel form-facing materials.

E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of the exposed concrete surface.

2. Furnish ties that, when removed, will leave holes not larger than 1 inch in diameter in concrete surface.

3. Furnish ties with integral water-barrier plates to walls indicated to receive damp proofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615 Grade 60, deformed.

B. Welded Wire reinforcement: ASTM A1064, flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.

2. Joint Dowel Bars: Plain-steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

2.4 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type II.

B. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:

1. Class: Severe weathering region, but not less than 3S.

2. Nominal Maximum Aggregate Size: 1-1/2 inches.

C. Water: Potable and complying with ASTM C 94.

2.5 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain no more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

G. Corrosion Inhibiting Admixture: ASTM C 1582.

2.6 WATERSTOPS

A. Hydrophilic waterstops shall be 1-inch wide by 3/4-inch thick strips of butyl rubber and mastic. Waterstops shall be Hydrotite by Greenstreak/Sika, Earth Shield type 20 by JP Specialties, Inc., Hydro-Flex 302 by the Henry Company, or approved equal.

B. Flexible PVC Waterstops: CE CRD-C 572, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes. Use profile as indicated.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

a. Greenstreak.

b. Meadows: W. R. Meadows, Inc.

c. Murphy: Paul Murphy Plastics Co.

d. Tamms Industries Co., Div. of LaPorte Construction Chemicals North America, Inc.

e. Vinylex Corporation.

2.7 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

F. Products: Subject to compliance with requirements, provide one of the following:

1. Evaporation Retarder:

a. Eucobar; Euclid Chemical Co.

b. Lambco Skin; Lambert Corporation.

c. E-Con; L&M Construction Chemicals, Inc.

d. MasterKure ER 50; BASF Corporation.

e. SikaFilm; Sika Corporation.

2. Clear, Waterborne, Membrane-Forming Curing Compound:

a. AH Clear Cure WB; Anti-Hydro International, Inc.

b. Diamond Clear VOX; Euclid Chemical Co.

c. Dress & Seal WB; L&M Construction Chemicals, Inc.

d. Vocomp-20; W. R. Meadows, Inc.

e. MasterKure CC 200 WB; BASF Corporation.

f. Horncure 100; Tamms Industries Co., Div. of LaPorte Construction Chemicals of North America, Inc.

2.8 RELATED MATERIALS

A. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

B. Epoxy Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Shore A hardness of 80 per ASTM D 2240.

C. Surface Sealant: 100% silane sealant.

D. Bonding Agent: Epoxy-Modified, Cementitious Bonding and Anticorrosion Agent: Product that consists of water-insensitive epoxy adhesive, Portland cement, and water-based solution of corrosion-inhibiting chemicals that forms a protective film on steel reinforcement.

1. Properties of the mixed cementitious bonding agent:

a. Time: Not less than 2 hours.

b. Color: Concrete gray.

2. Properties of the cured bonding agent:

a. Compressive Strength: 28 days: 6,000 psi min. (ASTM D 695).

b. Flexural Strength: 28 days: 500 psi min. (ASTM C 293).

c. Splitting Tensile Strength at 28 days: 500 psi min.

d. Bonding agent shall not produce a vapor barrier.

1. Manufacturer: MasterEmaco ADH 326 by BASF or approved equal.

E. Grout: All grout shall be non-shrink, non-metallic, non-gas forming preblended and ready for use requiring only the addition of water. Minimum 28 day compressive strength must be 5000 psi.

2.9 CONCRETE MIXES

A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test databases, as follows:

1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.

2. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the laboratory trial mix basis.

B. Structural Concrete: Includes all foundations, walls, pads, slabs, beams, columns and other elements except where specifically noted on the drawings. Proportion normal-weight concrete mix as follows:

1. Compressive Strength (28 Days): 4,000 psi.

2. Slump: 3 ½ inches ± 1 inch.

3. Maximum Slump for Concrete Containing High-Range Water-Reducing Admixture: 8 inches after admixture is added to concrete with 2- to 4-inch slump.

4. Except where otherwise specified, all concrete shall be air-entrained in the range of 5-7%.

C. Fill Concrete: Concrete not included in structural concrete. Proportion normal-weight concrete mix as follows:

1. Compressive Strength (28 Days): 2500 psi.

2. Slump: 3 inches ± 2 inch.

D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:

1. Fly Ash (ASTM C618): 25 percent.

2. Combined Fly Ash and Pozzolan (ASTM C618): 25 percent.

3. Silica Fume (ASTM C1240): 10 percent.

4. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

5. Slag (ASTM C989): 50 percent.

6. Total of fly ash, pozzolans, slag, and silica fume: 50 percent.

E. Maximum Water-Cementitious Materials Ratio: 0.45 for structural concrete; 0.50 for fill concrete.

F. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

G. Admixtures: Admixtures other than air entraining admixtures shall not be used without written approval of the ENGINEER. Use admixtures according to manufacturer's written instructions.

1. Superplasticizer (per ASTM C 494): a high-range water-reducing admixture in the concrete, as required, for placement and workability.

2. Water-reducing admixture: pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.10 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.1. FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

1. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual.

C. Construct forms tight enough to prevent loss of concrete mortar.

D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal. Do not use rust-stained steel form-facing material.

E. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

F. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

G. Chamfer exterior corners and edges of permanently exposed concrete as indicated on the Drawings.

H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor bolts, accurately located, to elevations required.

2. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.

B. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved the following:

1. At least 70 percent of 28-day design compressive strength.

2. Determine compressive strength of in-place concrete by testing representative field- or laboratory-cured test specimens according to ACI 301.

3. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

C. 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-release agent.

D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by the ENGINEER.

3.4 SHORES AND RESHORES

A. Comply with ACI 318, ACI 301, and recommendations in ACI 347 for design, installation, and removal of shoring and reshoring.

B. Plan sequence of removal of shores and re-shore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.

C. Accurately position support and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Shop- or field-weld reinforcement according to AWS D1.4, where indicated.

2. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS AT NEW CONCRETE LOCATIONS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by OWNER.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

2. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.

3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.

4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

6. Use an epoxy-modified cementitious bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

a. Exception: When a wall greater than five feet in height is to be placed on hardened concrete, epoxy bonding agents are not required.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.

3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Dowel Joints: Install dowel sleeves and dowels or dowel bar and support assemblies at joints where indicated. Use dowel sleeves or lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Before placing concrete, water may be added at Project Site, subject to limitations of ACI 301. Do not add water to concrete after adding high-range water-reducing admixtures to mix.

C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Place each layer while preceding layer is still plastic, to avoid cold joints.

1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.

2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches into proceeding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Maintain reinforcement in position on chairs during concrete placement.

3. Screed slab surfaces with a straightedge and strike off to correct elevations.

4. Slope surfaces uniformly to drains where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or may fall below 40 degrees F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F and not more than 80 degrees F at point of placement.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

4. When the average air temperature is expected to be less than 40 degrees F during the first 3 days after the concrete is poured, concrete shall be maintained at a minimum temperature of 50 degrees during that time. The minimum temperature shall be increased to 55 degrees for concrete less than 12 inches thick. Concrete temperature shall be recorded with high-low thermometers at opposite corners of the concrete pour at a maximum interval of 12 hours during that time. This period of time shall be increased to 7 days for concrete expected to resist partial construction loads prior to reaching the design 28-day strength.

F. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 degrees F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is CONTRACTOR's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove all fins and other projections exceeding 1/8 inch in height.

1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, damp proofing, veneer plaster, or painting.

2. Do not apply rubbed finish to smooth-formed finish.

B. Rubbed Finish: Apply the following to smooth-formed finished concrete (all exposed concrete). Remove formwork exposing only small sections at a time. Do not expose more concrete than can be troweled within 30 minutes. Expeditiously work surface of exposed walls with a steel concrete finishing trowel to bring latent cement to the surface. Lightly wet areas drying too quickly. Patch surface voids with Portland cement compound. Trowel entire wall in a circular pattern to achieve a uniform appearance. Protect until fully cured.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces. Coordinate floor finish and application of slab treatment and curing materials with requirements of finished flooring materials and traffic coating materials. Provide recommended finish and omit slab treatment and curing materials where application will be detrimental to adhesion and longevity of traffic coating and floor finish.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, Portland cement terrazzo, and other bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.

2. Finish and measure surface so gap at any point between concrete surface and an unleveled freestanding 10-foot- long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed the following:

    a. 3/16 inch for all concrete other than slabs-on-grade.

    b. 1/8 inch for all slabs-on-grade.

E. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with OWNER before application.

3.10 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bullfloating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the methods listed for unformed surfaces.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven (7) days with the following materials:

    a. Water.

    b. Continuous water-fog spray.

    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven (7) days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.

    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

    c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.11 LIQUID FLOOR/SLAB TREATMENTS

A. Penetrating Liquid Floor/Slab Treatment: Prepare, apply, and finish penetrating liquid floor/slab treatment according to manufacturer's written instructions.

1. Apply silane sealer to concrete slabs and walls in accordance with manufacturer’s specifications.

3.12 JOINT FILLING AT NEW CONCRETE LOCATIONS

A. Prepare, clean, and install joint filler according to manufacturer's written instructions. Defer joint filling until concrete has aged at least six (6) months. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semi-rigid epoxy joint filler full depth in saw-cut joints and at least 2 inches 50 mm deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.13 FIELD QUALITY CONTROL

A. Testing Agency: CONTRACTOR shall engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof. When frequency of testing will provide fewer than five compressive- strength tests for each concrete mix, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.

4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 degrees F and below and when 80 degrees F and above, and one test for each composite sample.

5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.

6. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample. Cast and field cure one set of four standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39; test two field-cured specimens at 7 days and two at 28 days. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.

C. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, CONTRACTOR shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

D. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

E. Test results shall be reported in writing to OWNER, concrete manufacturer, and CONTRACTOR within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

F. The CONTRACTOR shall provide the testing agency a minimum of 24 hours advance notification prior to all concrete operations.

G. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by ENGINEER but will not be used as sole basis for approval or rejection of concrete.

H. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by ENGINEER. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by the ENGINEER.

END OF SECTION

SECTION 03451

ARCHITECTURAL PRECAST CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Architectural precast concrete.

1. Fascia at top of wall where shown.

2. Sills for glass unit masonry and louver openings.

B. Supports, anchors, and attachments.

C. Sealing of joints.

D. Engineering design of architectural precast units.

1.2 RELATED SECTIONS

A. Section 03300 – CAST-IN-PLACE CONCRETE

B. Section 04230 – GLASS UNIT MASONRY

C. Section 04300 – UNIT MASONRY SYSTEM

D. Section 07900 – JOINT SEALERS

E. Section 08110 – STEEL DOORS AND FRAMES

1.3 REFERENCES

The publications listed below form a part of these specifications.

ACI 301	Specifications for Structural Concrete for Buildings
ACI 318	Building Code Requirements for Reinforced Concrete
ASTM A386	Zinc Coating (Hot-Dip) on Steel Products
ASTM C143	Test for Slump of Portland Cement Concrete
ASTM C150	Portland Cement
ASTM C260	Air-Entraining Admixtures for Concrete
ASTM A325	High Strength Bolts
ASTM A615	Deformed and Plain Billet Steel Bars for Concrete Reinforcement
ASTM C33	Concrete Aggregates
ASTM F593	Stainless Steel Bolts
PCI MNL-117	Manual for Quality Control for Plants and Production of Architectural Precast Concrete
PCI MNL-120	Design Handbook - Precast and Prestressed Concrete

1.4. DESIGN REQUIREMENTS

A. Provide the services of a professional engineer licensed to practice in New York State to design precast units to meet required loads, including reinforcing bar design and design of metal fabrications and anchoring devices to connect precast units to building masonry.

B. Design precast units and connection components to withstand all dead loads, wind loads, and erection forces. Reference the Design Parameters on Drawing S001.

B. Units shall accommodate construction tolerances, deflection of building structural members and clearances of intended openings.

C. Detail component connections to accommodate building movement and thermal movement. Provide adjustment to accommodate misalignment of structure without unit distortion or damage.

1.5 SUBMITTALS

A. Submit evidence that shows current Precast Concrete Institute (PCI) or Architectural Precast Association (APA) certification.

B. Shop Drawings – Submit shop drawings sealed by a professional engineer licensed to practice in New York State. Indicate layout, unit locations, configuration, unit identification marks, reinforcement, connection details, support items, location of lifting devices, dimensions, openings, relationship to adjacent materials, and concrete mix design. Provide erection drawings.

C. Samples – Submit one or more proposed match to the architectural precast that was installed on the previously constructed Guenther Pump Station building at the project site. Submit two samples for each proposed match. Samples are to be at least 2 inches by 3 inches by 3/4 inches.

D. Reference the approved sample as the standard for quality, color, and texture.

E. Submit catalog cut for grout.

1.6 QUALITY ASSURANCE

A. Manufacturer shall be a PCI- or APA-certified plant for production of precast concrete as specified herein.

B. Perform Work in accordance with the PCI MNL-117, PCI MNL-120, PCI Manual For Structural Design of Architectural Precast Concrete, and ACI 318.

C. The facilities shall be suitably enclosed to provide quality control and a consistently controlled environment during production, and the facilities shall also have sufficient capacity and equipment capable of producing the work all within the allotted time.

1.7 FIELD SAMPLES

A. Provide a field sample of one sill piece, sized to fit the masonry mock-up specified in Section 04300, Unit Masonry System, and shown on the Drawings.

B. Accepted sample may not remain as part of the Work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site using special care to protect units and prevent staining, chipping, or spalling of concrete. All units shall be stored off the ground.

B. Lifting or handling equipment shall be capable of maintaining “as new” condition of the units during manufacture, storage, transportation, erection, installation, and in position for fastening.

C. Mark units with date of production in location not visible to view when in final position in structure.

D. All damaged units shall be repaired or replaced to the satisfaction of the Engineer.

1.9 FIELD MEASUREMENTS

A. Verify field conditions and measurements prior to fabrication.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Southside Precast Products, Buffalo, NY.

B. Lakelands Concrete Products, Lima, NY.

C. Equally qualified plant with current PCI or APA certifications relevant to the scope of work.

2.2 CONCRETE MATERIALS

A. Cement - ASTM C150, Portland Type I or III.

B. Aggregates shall be natural sand for fine aggregate and crushed stone for coarse aggregate, complying with the requirements of ASTM C33.

C. Reinforcing Steel - ASTM A615, Grade 60, deformed steel bars. ASTM A185 for welded steel wire reinforcement. Strength and size commensurate with precast unit design.

D. Air Entrainment Admixture - ASTM C260.

E. Admixtures containing calcium chloride shall not be used.

F. The source of all cement and aggregates shall remain the same for all elements to ensure maximum uniformity of color and texture.

G. Surface Finish Aggregate - To match architectural precast installed on the existing Guenther Pump Station.

H. Grout - Non-shrink minimum 4,500 psi 7-day strength. Use Five Star Special Grout 130 or equal.

I. Water shall be potable, clear and free from deleterious substances.

2.3 CONNECTING AND SUPPORT DEVICES

A. Type 304 stainless steel.

B. Include all connecting materials required to transfer loads to supporting masonry, including embedded or embed-anchored plates, stand-off assemblies to position precast at the detailed distance from structural masonry, threaded rod anchors for adhesive insertion into masonry, and nuts and washers as required.

2.4 ACCESSORIES

A. Recessed Reglets – 304 stainless steel, 0.020" minimum metal thickness, designed for casting into concrete and to receive snap-in cap flashing.

1. Fry Reglet "CO" concrete reglet, or equal.

2. Furnish 304 stainless steel snap-in cap flashing for installation under Section 07505: Fry Reglet Springlok, or equal.

B. Sealant - Specified in Section 07900, Joint Sealers.

2.5 MIX

A. Concrete - Minimum 5000 psi, 28-day strength, air entrained to 6 percent in accordance with ACI 301.

2.6 FABRICATION

A. Maintain plant records and quality control program during production of precast units. Make records available upon request.

B. Use rigid molds, constructed to maintain precast unit uniform in shape, size and finish. Molds shall be constructed of steel, plastic coated wood, or fiberglass.

C. All exposed edges and corners shall have a radius or chamfer to avoid sharp weakened areas that are vulnerable to breakage.

D. Place recessed flashing reglets continuous and straight.

E. Locate hoisting devices to permit removal after erection.

F. All concrete shall be consolidated in the forms by means of internal and/or external vibration to assure high-density concrete. Concrete shall be transported, placed and vibrated in a manner that will prevent segregation. Proper care shall be taken to assure that all reinforcing, inserts, etc., remain in the proper location during concrete placement.

G. Proper curing of all units is required to minimize shrinkage and to obtain concrete design strengths. Stripping of precast units shall not commence until concrete has reached a minimum average strength of 2,500 psi.

H. Maintain consistent quality during manufacture.

I. Precast items shall be smooth gray concrete. When possible, exposed surfaces shall be cast against the form with other non-form exposed surfaces steel troweled.

J. Immediately upon stripping, fill and rub all surface imperfections resulting from air, water, or form oil with a mixture of the same cement and sand as used for the concrete placement. Prior to shipment, the skin (cement paste surface) of all exposed surfaces shall be removed by means to assure a more uniform surface. This etching shall produce a "sand finish" surface similar to sand finish plaster. Surfaces shall be washed with water.

K. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.

L. Minor patching in plant is acceptable, providing structural adequacy and appearance of units is not impaired.

2.7 FINISH - PRECAST UNITS

A. Exposed-to-view finish surfaces of precast units are be uniform in color and appearance.

B. Match the texture and color of the architectural precast cornice of the existing Guenther Pump Station.

1. Use a clean section of the existing precast as the basis for the color and texture match.

2.8 FABRICATION TOLERANCES

A. Overall dimensions for small size elements such as mullions, sills, etc., shall not vary more than $\pm$1/4 inch in length and $\pm$1/8 inch in a cross section.

B. Maximum Out of Square - 1/8 inch in 10 feet non-cumulative.

C. Variation From Dimensions Indicated on Drawings - $\pm$1/4 inch.

D. Maximum Misalignment of Anchors, Inserts, Weld Plates - 1/4-inch.

E. Maximum Bowing of Units - Length of span/360.

F. Location of Reglets - 1/4-inch from true position.

2.9 SOURCE QUALITY CONTROL AND TESTS

A. Provide testing and analysis of concrete mix.

B. Take four concrete test cylinders at least once for each day of production and for every 5 cubic yards of concrete placed in accordance with ASTM C31. One to be broken at 7 days, 2 at 28 days and 1 held in reserve.

C. Take slump tests for every batch and/or placement operation, in accordance with ASTM C143.

D. Perform one air entrainment test for each set of concrete test cylinders taken.

E. Records of these tests shall be made available to the Engineer upon request.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that building structure, anchors, and openings are ready to receive work of this Section.

3.2 PREPARATION

A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.

B. Provide necessary hoisting equipment.

3.3. ERECTION

A. Erect units without damage to shape or finish. Replace or repair damaged units.

B. Erect units level and plumb within allowable tolerances.

C. Align and maintain uniform horizontal and vertical joints as erection progresses.

D. Chips, cracks, spalls or other damaged incurred in storage, shipment and/or erection shall be patched only by the manufacturer to the Engineer's satisfaction, providing the damage is not detrimental to the element's structural function.

E. Exposed Joint Dimension - 3/8 inch.

3.4. ERECTION TOLERANCES

A. Maximum Variation from Plane of Location - 1/4 inch in 10 feet and 3/8 inch in 100 feet, non-cumulative.

B. Maximum Offset from True Alignment Between Two Connecting Units - 1/8 inch.

C. Joint Tolerance - $\pm$1/4 inch.

END OF SECTION

SECTION 03480

PRECAST CONCRETE VAULTS AND CHAMBERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Factory design and manufacture of reinforced precast concrete structures including vaults, chambers and related accessories.

B. Quality assurance and control.

C. Field installation of precast concrete structures.

D. Exterior waterproofing of precast concrete structures.

E. Installation of access hatches and miscellaneous accessories.

F. Ladders and safety devices.

G. Schedule of Precast Structures.

1.2 RELATED SECTIONS

A. Section 01400 – Quality Control

B. Section 02316 – Select Granular Materials

C. Section 02351 – Excavation, Backfill And Trenching

D. Section 03300 – Concrete

E. Section 05500 - Miscellaneous Fabrications

1.3 REFERENCES

A. American Concrete Institute:

1. ACI 301 - Specifications for Structural Concrete
2. ACI 315 - Details and Detailing of Concrete Reinforcement
3. ACI 315R - Manual of Engineering and Placing Drawings for Reinforced Concrete Structures
4. ACI 318 - Building Code Requirements for Structural Concrete

B. American Society for Testing and Materials:

1. ASTM A185 - Steel Welded Wire Reinforcement, Plain, for Concrete

2. ASTM A497 - Steel Welded Wire Reinforcement, Deformed, for Concrete

3. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement

4. ASTM C857 - Minimum Structural Design Loading for Underground Precast Concrete Utility Structures

5. ASTM C858 - Underground Precast Concrete Utility Structures

6. ASTM C891 - Installation of Underground Precast Concrete Utility Structures

C. Concrete Reinforcing Steel Institute:

1. CRSI 63 - Recommended Practice for Placing Reinforcing Bars

D. Certifications

1. NPCA - National Precast Concrete Association

2. PCI - Precast/Prestressed Concrete Institute

1.4 DESIGN

A. All precast structures shall be designed by a licensed Professional ENGINEER registered in the State of New York and engaged by the precast manufacturer.

B. The calculations and drawings shall be prepared by the licensed Professional ENGINEER in a neat and legible manner. The prepared calculations shall include a design summary page to list all design loads, most current design standards, material specifications, and design criterion used in the calculations. This summary page shall be sealed by the licensed Professional ENGINEER.

C. All vaults shall be designed for the design loadings specified in ASTM C857. These loadings shall include all dead loads, live loads, hydrostatic loads, lateral earth loads, surcharge loads, bearing loads, and erection (lifting loads). In addition to these typical loads, the designs shall include:

1. Flotation check with groundwater assumed at grade with a 50 percent factor of safety.

2. All precast vaults shall be designed for H-20 traffic load. The H-20 load shall be applied on the top slab and as a surcharge load on the walls.

3. Refer to the Contract Drawings for precast structure configurations and loading conditions.

1.5 SUBMITTALS

A. Submit evidence that shows precast supplier has a current PCI, NPCA, and/or NYSDOT certification.

B. Submit shop drawings of wall section(s), slab top, and base proposed for each precast structure. Include joint design detail(s) and other related details for field assembly. Indicate conformance with Contract Documents and ASTM C858 as applicable.

C. Submit catalog cuts for aluminum access hatches with fall protection grates, frames and covers, and ladders with telescoping safety posts.

D. Submit catalog cuts and installation instructions for waterproofing systems.

E. Under a separate submittal, provide two file copies of calculations with a sealed design summary page for each precast structure design. Other than the design summary page, calculations will not be reviewed by the ENGINEER. Calculations will not be returned to the CONTRACTOR.

1.6 COORDINATION

A. CONTRACTOR shall verify all precast structure penetration sizes, elevations, and locations.

B. CONTRACTOR shall verify elevations of proposed final grades and pipe invert elevations to determine overall height of precast structure(s) and height of risers.

C. CONTRACTOR shall supply the access hatch, frame and cover, ladder, and other accessories to the precast supplier.

1.7 QUALITY ASSURANCE

A. Manufacturer shall be a PCI-, NPCA-, and/or NYSDOT-certified plant for production of precast structures as specified herein.

B. Concrete used in producing precast structures shall be from a NYSDOT-approved batch plant.

1.8 QUALITY CONTROL INSPECTION

A. The quality of all materials, the production process of the precast supplier, and the finished cast structures shall be subject to inspection by the ENGINEER. Such inspection may be made at the place of manufacture, and or on the work site after delivery.

B. All sections of precast structure shall be inspected for general appearance, dimensions, soundness, etc. The surfaces shall be dense, close-textured and free of honeycomb, cracks, roughness, exposure of reinforcement, damaged joints, or other irregularities.

C. All precast sections, which have been damaged after delivery will be rejected, or if already installed, shall be repaired or removed and replaced entirely at the CONTRACTOR’s expense.

D. Rejected precast sections shall be tagged as such, segregated from other sections, and removed from the job site.

PART 2 PRODUCTS

2.1 CONCRETE

A. Minimum 28-Day Compressive Strength – 5,000 psi.

B. All concrete components shall be air entrained for severe exposure in accordance with ACI 301.

2.2 REINFORCEMENT

A. Deformed Reinforcing Bars - ASTM A615, Grade 60.

B. Welded Wire Reinforcement (WWR) - ASTM A185 for plain wire and ASTM A497 for deformed wire.

C. Fiber Reinforcement - ASTM C1116, polypropylene fibers.

2.3 PRECAST CONCRETE BASES

A. Design and manufacture of precast concrete bases shall conform to the requirements of this section and ASTM C858 as applicable.

B. Bases shall conform to the dimensions indicated on the Contract Drawings or as required by design. The horizontal joint at the top of the base shall be compatible with that of the adjoining precast wall section.

C. Floor sumps shall be constructed where shown on the Contract Drawings. Bases shall be overlaid with a concrete topping sloped to a formed sump, created in the concrete topping, as shown on the Contract Drawings. A coating of bonding agent shall be applied on the base slab prior to casting of concrete topping.

2.4 PRECAST CONCRETE WALL SECTIONS

A. Design and manufacture of precast concrete wall sections shall conform to the requirements of this section and ASTM C858 as applicable.

B. Inside dimensions of walls shall conform to the dimensions indicated on the Contract Drawings.

C. All tongue-and-groove joints in the precast wall sections, including the joint at the top of the base, shall consist of gaskets. Joints may also consist of butyl joint sealant rope material in lieu of a gasket.

D. The tongue-and-groove joints shall be constructed with a special groove to receive and hold the gasket in position during joint assembly.

2.5 PRECAST CONCRETE SLAB TOPS

A. Precast reinforced concrete slab tops shall be manufactured in accordance with ASTM C858 as applicable. Openings, embedded hatches, and cover frames shall be provided where shown.

B. Slab tops shall be crowned or sloped to drain, minimum 1/4 inch per foot.

2.6 OPENINGS AND INSERTS

A. All openings required in the concrete shall be reinforced with additional diagonal bars tied to each layer of wall or slab reinforcement.

B. Any required inserts and wall or slab openings shall be coordinated with mechanical requirements prior to casting the precast sections.

2.7 PIPE SEALS

A. Where polyethylene, plastic or PVC pipe is utilized, connections between precast openings and pipes shall be made with flexible rubber sleeves with stainless steel straps and bolts. Provide an elastomeric waterstop gasket where sleeve sizes are not commercially available.

B. For steel or ductile iron pipe, provide a pipe sleeve sized to accept the pipe plus a mechanical link seal. The remaining annular space between the pipe wall and sleeve shall be packed with non-shrink grout. Before the grout has set, the CONTRACTOR shall recheck invert elevations of the pipe.

2.8 ACCESS HATCHES AND FRAMES AND COVERS

A. Frames and Cover

1. Made from best merchantable gray cast iron, tough, even-grained, and free from all flaws and injurious or unsightly defects, ASTM A48, Class 30, cast iron.

2. Frames and covers shall be rated for HS-20 loading, latest revisions.

3. All covers for catch basins shall be bicycle safe type covers.

4. Letters to be cast on every manhole cover as shown on the Drawings. If not detailed on drawings, covers for manhole vaults shall be provided with the designation “sanitary”.

5. Machined to insure proper fit and even bearing in all positions.

6. Properly clean castings and coat with asphaltic varnish applied by immersion, while the coating is hot.

7. Product and manufacturer:

   a. Provide one of the following:

      1. Septic Tank
         a. Neenah Foundry Co., Model R-1916-D (24-inch) Watertight Manhole Frame and Cover.
         b. EJ (Syracuse Castings), Watertight Manhole Frame and Cover.
         c. Or approved equal.

      2. Catch Basins
         a. Catch Basin Frame and Cover – Grate Top – Model No. R4832B, Bicycle Proof, by Neenah Foundry Co.
         b. EJ (Syracuse Castings), Frame and Cover – Grade Top – Bicycle Proof.
         c. Or approved equal.

2.10 WATERPROOFING

A. Around the exterior of all wall tongue-and-groove joints, apply the “Grace Bituthene 3000” primer and membrane waterproofing system by Chemical Construction Products, or equal.

B. Exterior wall surfaces shall be waterproofed using manufacturer’s standard two-coat system, specifically designed to waterproof the exterior of concrete surfaces in a below-grade submerged condition.

2.11 SEPTIC TANK

A. Septic Tank volume shall be 500-gallon capacity.

B. Tank shall be designed to support H-20 traffic load.

C. Buried depth shall be 0-6 feet below finished grade as specified on contract drawings.

D. Pipe inlet and outlet shall be stock knockout 8” diameter, designed for 4-inch diameter SDR-35 PVC

E. Tank access hatch frame and cover shall be cast iron (bolted and gasketed). Riser rings shall be used to bring access hatch covers flush with finished grade.

F. A 24-inch diameter access with frame and cover, riser rings as required to bring rim to grade, shall be over the inlet pipe. A 6-inch diameter tapper plug access with 12-inch diameter frame and cover, riser rings as required to bring rim to grade, shall be over the outlet pipe.

G. Septic tank outlet shall be connected to existing leach field.

H. Effluent filter shall be installed at outlet pipe.

I. Manufacturer shall be Kistner Concrete Products Inc. Model ST-ST500T OR Equal.

2.12 CATCH BASINS

A. In addition to the general requirements for precast concrete structures outline above, the following shall apply:

1. Precast concrete catch basins shall be manufactured as one or two piece units with integral bottom and wall cast in one pour per piece so that there are no joints present in the sections.

2. Catch basin base and walls shall be of acceptable design and of sufficient strength to safely support HS-20 loading.

3. For precast concrete base section, the minimum thickness of base slab shall be 6-inch thickness.

4. Precast concrete walls for catch basin shall be 6-inch thickness except at knockouts where the minimum thickness shall be 2 inches.

5. Pipe connections to catch basins for storm drainage piping shall consist of a knockout in the catch basin wall for installation of the proposed piping.

6. The void between the proposed piping and the wall of the catch basin shall be grouted with cement – mortar grout and shall be approved by the ENGINEER.

7. Product and manufacturer:

   a. Kistner Concrete Products.

   b. Fort Miller, Inc.

   c. Or approved equal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that subgrade elevations are correct, excavation is dewatered, and subgrade is pre-compacted.

B. Verify that rejected precast sections have been either clearly marked “REJECTED” or removed from site.

3.2 PREPARATION

A. Provide foundation layer of compacted structural fill to support base. Foundation layer shall be minimum 12 inches in depth or as shown on the Contract Drawings and shall be placed over firm, sound subgrade. Excavate and remove subgrade material as necessary to reach firm, sound subgrade.

B. Foundation layer shall be a minimum of 1 foot greater than the footprint of the precast structure base, and shall be compacted to a uniform, level surface.

3.3 INSTALLATION

A. Base of precast structure shall be accurately located and uniformly supported on the compacted foundation layer in a level position.

B Precast sections shall be laid-up plumb and level.

C. Install precast wall sections in properly oriented position; follow manufacturer’s instructions for joining together each section using the gaskets. After joint assembly, the gap between precast sections shall be packed on the inside and outside with non-shrink grout and shall be troweled smooth so that no projections remain on the inside. There shall be concrete to concrete bearing between the various sections. The gasket shall not support the weight of the section after erection.

D. The CONTRACTOR is responsible for the integrity of all materials and protection against flotation during the installation and backfilling process.

3.4 APPLICATION OF WATERPROOFING

A. All exterior below-grade wall joints shall be sealed using a membrane waterproofing system. Next, all below-grade wall surfaces shall be waterproofed with approved product, applied per manufacturer’s instructions.

3.5 BACKFILLING

A. Backfill structure, being careful to provide full support under connecting pipes using compacted bedding material.

B. Backfill operation shall not damage exterior waterproofing system.

C Once backfilling is complete, the structure shall be checked for leaks. All visible leaks shall be sealed in an approved manner.

3.6 INSPECTION

A. Precast Sections

1. Precast section shall be installed level on a flat stable subgrade. Where an unstable condition exists, the CONTRACTOR shall excavate the unstable material and replace with compacted granular material.

2. All joints shall be filled inside and out with mortar to provide a smooth and continuous surface.

B. Benchwalls and Inverts

1. Mortar surfaces of benchwalls and concrete floors shall be given a broom finish. Where inverts are required they shall be lined with a half section of pipe of the same type used for the sewer or shall be constructed of Class “B” concrete, shaped and troweled to produce a smooth circular cross-section.

C. Frames and Castings

1. Frames and castings shall be set in a full bed of mortar a maximum of 1/2" thick. Where required to adjust the frames and castings to grade there shall be installed to a maximum of four brick courses.

D. Steps

1. Steps shall be installed in vertical alignment spaced 12-inches on center.

2. In concrete sections, the steps shall be cast into the section or secured with cadmium-plated bolts to threaded inserts, which are precast, into the concrete.

3. In masonry construction, the steps shall be built into the masonry walls.

E. Plastering

1. Plaster shall be with mortar not less than 2-inch thick and troweled smooth.

2. Outside of masonry structures.

3. Inside and outside of brick courses under frames and castings.

C. Sumps

1. Sumps of the size specified shall be built into the floors of vaults and similar structures. Floors shall be sloped to the sump.

D. Lifting holes shall be sealed tight with a solid rubber plug driven into hole and remaining void filled with a mix of 1 part cement and 2 part sand mortar.

E. All precast concrete structures shall be free from visible leakage: each structure shall be tested for leaks and inspected and all leaks shall be repaired in a manner subject to the ENGINEER’S approval.

1.7 SCHEDULE OF PRECAST STRUCTURES

PRECAST STRUCTURE IDENTIFICATION	REFERENCE DRAWING
Catch Basin	C002
Septic Tank	C002

END OF SECTION

SECTION 04230

GLASS UNIT MASONRY

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. Furnish and install glass block unit masonry system, including:

1. Glass block units that are constructed to achieve improved resistance to heat transfer.
2. Panel anchors and fasteners.
3. Expansion strips.
4. Horizontal joint reinforcement.
5. Mortar.
6. Sheet metal sill flashing.
7. Joint sealers.
8. Asphalt emulsion.

1.2 RELATED SECTIONS

A. Section 03451 - Architectural Precast Concrete

B. Section 04300 - Unit Masonry System

C. Section 05500 - Metal Fabrications

D. Section 07900 - Joint Sealers

1.3 REFERENCES

ASTM International Publications	
ASTM A792	Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
ASTM C150	Standard Specification for Portland Cement
ASTM C207	Standard Specification for Hydrated Lime for Masonry Purposes
ASTM C270	Standard Specification for Mortar for Unit Masonry
ASTM D1187	Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal

1.4 PERFORMANCE REQUIREMENTS

A. Provide glass block units with a U-Value of no greater than 0.19 Btu/h · ft^2 · ^oF for the individual glass block unit.

B. Provide glass blocks that have a solar heat gain coefficient (SHGC) for individual, un-installed blocks of 0.43 or less so that, when assembled, inclusive of mortar joints, in an opening of a nominal size of 4-feet tall by 4-feet wide, the opening will have an SHGC of no greater than 0.40.

1.5 SUBMITTALS

A. Submit product data for the products specified in this section.

1. Provide information regarding product configuration, dimensions, and (where relevant) appearance.

2. Provide product literature or test data indicating that submitted products, including accessories, comply with referenced standards listed in 1.03 of this Section, and the tested characteristics of basis-of-design products listed in Part 2 of this Section.

3. Provide evidence that installed products will meet the performance requirements of Article 1.4 of this Section.

4. Where product literature shows options, clearly mark the options proposed for this Project. Mark in such a manner that markings will be visible if literature is photocopied, scanned, or converted to grayscale.

B. Submit manufacturers' published installation details and instructions that are relevant to the type of construction shown for openings in the Contract Drawings.

1. Include a shop drawing showing the dimensions, base metal, profiles and finishes of the sill flashing proposed for this Project.

C. Samples. – Submit samples of:

1. Glass block units.

2. Panel anchors.

3. Horizontal joint reinforcement.

4. Expansion strips.

D. Warranty – Provide an unexecuted copy of the manufacturer's standard warranty for the glass block units. List the name of this project and the specific products carrying the warranty on the document.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site in a manner that prevents damage from construction activity or the environment.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not install glass block units when temperature is 40°F (4°C) and falling. Maintain the temperature of glass unit masonry above 40°F (4°C) for the first 48 hours after construction.

1.8 COORDINATION

A. Coordinate the work of this section with the work of the sections listed in Article 1.2 of this section.

PART 2 PRODUCTS

2.1 GLASS BLOCK UNIT MANUFACTURERS

A. Seves Glass Block Inc., Broadview Heights, OH.

B. Other manufacturer that can provide glass block units that provide equal thermal performance; are available in dimensions that are compatible with the opening sizes in the Project; and that have substantially similar appearance to the basis of design product.

2.2 GLASS BLOCK UNIT MASONRY SYSTEM BASIS OF DESIGN PRODUCTS

A. Glass block units

1. Constructed with two internal air spaces, sub-divided by a low-emissivity-coated center glass pane, to achieve improved resistance to heat transfer.

2. Nominal size of 8-inches wide by 8-inches high by 3-inches thick; actual size 7.75-inches by 7.75-inches by 3.125-inches so that, when installed with mortar, embedded panel anchors and horizontal joint reinforcement; the installation will result in 8-inch on center horizontal and vertical placement of glass block units.

3. Energy Saving 1.1, Nubio style, 8x8x3 by Seves Glass Block.

B. Panel anchors and fasteners

1. Punched 20 or 22 gauge, Type 304 stainless steel, designed to be bent at right angles to connect mortar joints to perimeter construction.

2. Typically supplied in 1.75-inch width by 16-inch length.

a. Seves Glass Block Panel Anchor.

b. Hohmann & Barnard Glass Block Panel Anchor.

c. Or equal.

3. Fasteners to Secure Panel Anchors to Perimeter Masonry – Hex Washer Head (HWH) 0.25-inch diameter by 1.25-inch long Type 410 stainless steel masonry anchors.

a. Tapcon by Red Head.

b. Or equal.

C. Expansion strips

1. 0.375-inch thick polyethylene, or closed cell neoprene, foam sheet, trimmed to width 0.375-inches less than the actual overall thickness of the glass block unit.

a. Seves Glass Block Expansion Strip.

b. Hohmann & Barnard NS Closed Cell Neoprene Sponge.

c. Or equal.

D. Horizontal joint reinforcement

1. Ladder style with two parallel 9 gauge Type 304 stainless steel wires, spaced 1.625-inches or 2-inches apart, and with cross wires 12-inches or 16-inches on center.

a. Seves Glass Block Panel Reinforcing.

b. Hohmann & Barnard 220 Ladder-Mesh.

c. Or equal.

E. Mortar

1. ASTM C270 Type S.

2. Cementitious materials limited to Portland Cement and lime.

a. Portland Cement – Type I per ASTM C150.

b. Lime – Dolomitic pressure-hydrated lime, Type S per ASTM C207.

3. With water-repellant admixture.

a. Integral Waterpeller Powder (not liquid) by Euclid Chemical Company.

b. Or equal.

4. Coordinate mortar color with mortar supplied for face brick specified in Section 04300 (Unit Masonry System).

F. Joint sealers

1. Two-component non-sag polyurethane as specified in Section 07900 (Joint Sealers).

2. Color to match mortar used in glass block assembly.

G. Asphalt emulsion

1. Water based, conforming to ASTM D1187, Type II.

PART 3 EXECUTION

3.1 EXAMINATION

A. Ensure wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.2 PREPARATION

A. Protect adjacent work areas and finished surfaces from damage during product installation.

3.3 INSTALLATION

A. Secure sill flashing to supporting construction with appropriate mastic.

B. Install panel anchors along jambs and head starting at first joints away from corners and spaced no more than 16-inches on center thereafter. Secure to perimeter masonry with stainless steel hex-head masonry screws. Extend panel anchors no less than 12-inches into mortar joints.

C. Cover sill area with a heavy coat of asphalt emulsion. Allow emulsion to cure at least 2 hours before placing mortar.

D. Place or adhere expansion strips to jambs and head. Make certain expansion strips extend to sill and cover legs of panel anchors that are attached to jambs and head.

E. Set a full mortar bed joint, applied to sill.

F. Set lower course of block. Maintain a uniform joint width of 1/4 to 3/8 inch plus or minus 1/8 inch. All mortar joints must be full and not furrowed.

G. Do not use steel tools to tap blocks into position.

H. Do not realign, tap or otherwise move block after initial placement.

I. Install panel reinforcing every 16 inches o.c. maximum (starting after the first course) in the horizontal mortar joints, in the same joints as panel anchors. Run reinforcing continuously from end to end of panels. Lap reinforcing not less than 6 inches whenever it is necessary to use more than one length.

J. Do not bridge expansion joints with reinforcing.

K. Install reinforcing as follows:

1. Place lower half of mortar in bed joint. Do not furrow.

2. Press panel reinforcing into place.

3. Cover panel reinforcing with upper half of mortar bed and trowel smooth. Do not furrow.

L. Place full mortar bed for joints not requiring panel reinforcing - do not furrow. Maintain uniform joint width.

M. Set succeeding courses of block. Spaces at head of panel and jambs must remain free of mortar for caulking with sealant.

N. Use only wooden or rubber tipped tools when tapping glass blocks into place.

O. Strike joints smooth while mortar is still plastic and before final set. Roughly tooled joints can leak. Remove surplus mortar from faces of glass blocks and wipe dry. Tool joints smooth and concave before mortar takes final set. At this time, remove and clean out all excess mortar from jambs, head and other locations.

P. After final mortar set (approximately 24 hours), install backer rods (if needed) between glass block panel and jamb and head locations. Leave space for sealant.

Q. Apply sealant evenly to the full depth of recesses as indicated on the drawings and in accordance with the manufacturers' published application manual and instructions.

3.4 CLEANING

A. Remove surplus mortar from the faces of the glass block at the time joints are struck or tooled.

B. Remove mortar while it is still plastic using a clean, wet sponge or an ordinary household scrub brush with stiff bristles.

C. Clean glass block, adhering strictly to glass block manufacturer's instructions and cautions.

END OF SECTION

SECTION 04300

UNIT MASONRY SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Hollow and solid load bearing block units.

B. Brick masonry veneer units.

C. Factory pre-mixed (including sand) mortar.

D. Grout.

E. Reinforcement, anchorage, and accessories.

F. Repointing

G. Preconstruction materials testing.

H. Preconstruction meeting.

1.2 RELATED SECTIONS

A. Section 03300 - CONCRETE

B. Section 05500 - MISCELLANEOUS FABRICATIONS

C. Section 07213 - BOARD INSULATION

D. Section 07900 - JOINT SEALERS

E. Section 09900 - PAINTING

1.3 REFERENCES

A. ACI 530 - Building Code Requirements for Masonry Structures

B. ACI 530.1 - Specifications for Masonry Structures

C. ASTM A951 - Masonry Joint Reinforcement

D. ASTM C67 - Sampling and Testing Brick and Structural Clay Tile

E. ASTM C90 - Load Bearing Concrete Masonry Units

F. ASTM C109 - Test Method for Compressive Strength of Cement Mortars

G. ASTM C140 - Sampling and Testing of Concrete Masonry Units

H. ASTM C173 - Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

I. ASTM C216 - Facing Brick (Solid Masonry Units Made From Clay or Shale)

J. ASTM C270 - Mortar for Unit Masonry

K. ASTM C305 - Properties of Fresh Mortar

L. ASTM C315 - Clay Flue Linings

M. ASTM C404 - Aggregates for Masonry Grout

N. ASTM C476 - Specifications for Grout for Masonry

O. ASTM C780 - Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry

P. ASTM C979 - Pigments for Integrally Colored Mortar/Concrete

Q. ASTM C1093 - Standard Practice for the Accreditation of Testing Agencies for Unit Masonry

R. ASTM C1019 - Sampling and Testing Grout

S. ASTM C1314 - Construction and Testing Masonry Prisms to Determine Compliance with Specified Compressive Strength of Masonry

T. ASTM C1329 - Specification for Mortar Cement

U. BIA - Brick Institute of America

V. NCMA - National Concrete Masonry Association

W. UL - Underwriters Laboratories

1.4 SUBMITTALS

A. Obtain written approval of submittals prior to use of the materials.

B. Test results required by this section shall be from an independent laboratory employing technicians with a current “Certification in Concrete Masonry Testing” by the National Concrete Masonry Association. Reference paragraph 3.1.C of this section.

C. Provide sampling and test data for concrete masonry units (CMU).

1. Submit reports per ASTM C90 and ASTM C140 for the following:

a. Face shell and web thicknesses.

b. Testing for water absorption.

c. Compressive strength tests.

d. Density.

Note: All data shall be dated from 24 months or less preceding the date the submittal is received by the ENGINEER.

2. Samples obtained for ASTM C140 tests shall have been prepared with the same configuration, dimension, concrete mix, and curing methods as CMU used for prism testing.

3. Note: If current tests of identical units as those proposed for the project are not available, the CONTRACTOR will be required to have current tests performed. ASTM C140 tests for CMU require at least 28 days for completion. CONTRACTOR is responsible for having CMU produced and shall have tests scheduled and performed so that testing lead time does not delay the project schedule.

B. Provide test results for brick units.

1. Submit test results per ASTM C216 and ASTM C67 for the following:

a. Grade of brick units.

b. Initial rate of absorption.

c. Compressive strength.

d. Testing for water absorption.

e. Dimensional tolerances.

Note: All data shall be dated from 24 months or less preceding the date the submittal is received by the ENGINEER.

2. Samples obtained for ASTM C67 tests shall have the same composition, method of manufacture, configuration, and dimension as brick proposed for use in the project.
Note: CONTRACTOR shall allow for such time as may be required for ASTM C67 testing and have tests scheduled so the testing lead time does not delay the project schedule.

C. Provide preconstruction test data for factory premix mortar. Submit the following for each type of mortar that is to be used for this project:

1. List amount of mix ingredients per volume.

a. Mortar cement.

b. Hydrated lime.

c. Aggregate ratio (this test result is by weight).

d. Water.

2. Submit the following test reports per ASTM C780 and ASTM C109:

a. 28-day compressive strength tests.

b. Water retention.

c. Air content.

3. One ASTM C109 and one ASTM C780 test (three specimens comprise one test) shall be performed for each mortar mix design to be used on this project. Mortar mixes tested shall include any admixture specified or proposed to be used by the CONTRACTOR.

4. Note: All data shall be dated from 24 months or less prior to the date the submittal is received by the ENGINEER.

D. Provide test data for grout mix. Submit the following data per ASTM C1019:

1. List amount of mix ingredients.

a. Cement.

b. Hydrated lime.

c. Fine aggregate.

d. Coarse aggregate.

e. Water.

f. Admixtures (if proposed).

2. Slump test of grout.

3. Type and number of units used to form mold for specimens.

4. Compressive strength tests.
Note: All data shall be dated from 24 months or less preceding the date the submittal is received by the ENGINEER.

E. Provide manufacturer's product data sheets for all products listed under Article 2.08 of this section. Product data sheets shall be clearly marked to indicate which specific item is being proposed for this project. The proposed features of each item, such as material, gauge, and options; shall be clearly indicated.

F. Line diagrams of shapes and sizes for all masonry units on the job.

G. Manufacturer's standard sample boards (illustrating color, texture, and extremes in color range) for each proposed brick style. Submit additional alternative brick styles as required to obtain Owner's approval.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with ACI 530, 530.1, listed references, and this specification.

B. Where conflicts occur between current referenced publications and this specification, the more restrictive requirements shall apply.

C. Failure to detect defective work or material does not prevent later rejection.

1.6 REGULATORY REQUIREMENTS

A. Requirements for fire rated masonry construction to be determined by Equivalent Thickness Method per NCMA TEK No. 7-3.

B. Provide access to the work as needed for Special Inspections as required by Chapter 17 of the latest edition of the New York State Building Code.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Adhere to ACI 530.1, Part 1.8C, “Cold Weather Construction,” when the ambient temperature or the temperature of masonry units is 40 degrees F or less.

B. Adhere to ACI 530.1 Part 1.8D, “Hot Weather Construction,” when ambient temperature is 90 degrees F or greater.

1.8 MOCK-UP PANELS

A. All submittals must be approved before the mock-up is constructed. The mock-up is not to be used for color selection. Unit masonry color will be pre-selected from the submittals.

B. The mock-up shall be constructed using masonry units from the same lot as will be used in project construction, so the full range of colors, textures, and finishes that can be expected on the project, will be demonstrated in the panel.

C. Provide mock-up, facing south and in direct sunlight.

D. Mock-up shall be constructed according to the design shown on the Drawings of all approved materials which include, but are not limited to, brick, block, mortar, reinforcing, vapor barrier, insulation, anchors, mortar control, flashing, lintel, vents, weeps, grouted bond beam, opening with lintels, precast concrete sill, coping, and belt course, vertical reinforcing, caulked and uncaulked expansion/control joint, etc. Workmanship elements include, but are not limited to, bonding, coursing, joint thickness, and tooling.

E. Additional mock-ups shall be constructed until accepted by the ENGINEER. Accepted mock-up demonstrates minimum standard for Work. Mock-up may not remain as part of the Work.

1.9 PRE-INSTALLATION CONFERENCE

A. Convene 1 week prior to commencing work of this section. CONTRACTOR shall coordinate meeting. ENGINEER shall be present to review mock-up panel. ENGINEER/Architect shall be present to review masonry details and expectations.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Inspect masonry units for damage. Return damaged units exceeding ASTM standards.

B. Store to permit air circulation while preventing moisture intrusion.

C. Factory premixed mortar accepted in unbroken, labeled packaging. Return hardened, partially set, caked, contaminated, or deteriorated materials.

D. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.11 SEQUENCING AND SCHEDULING

A. Coordinate work with Article 1.2 of this specification.

PART 2 PRODUCTS

2.1 MANUFACTURERS – CONCRETE MASONRY UNITS

A. Hollow and Solid Load Bearing Block Units:

1. Barnes & Cone Inc., Syracuse, NY.

2. The Buffalo Block Co., Inc., Buffalo, NY.

3. Or equal.

2.2 CONCRETE MASONRY UNITS

A. Hollow and Solid Load Bearing Block Units – ASTM C90, normal weight, 1900 psi compressive strength.

1. Width as shown on Drawings - Nominal modular size of width x 16 inches long x 8 inches high.

2. Provide special units for 90-degree corners, jambs, bond beams, and lintels.

3. Bond Beam Units – 8 inches high or 16 inches high as shown on the Drawings with solid bottoms and open ends. First course of CMU wall to be knockout-type block.

4. Lintel Units – 8 inches high or 16 inches high with solid bottoms and open ends or as shown on the Drawings.

5. Color - Natural concrete.

B. Lightweight hollow and solid load bearing block units – ASTM C90, weight of 105 pounds per cubic foot or less, 1900 psi compressive strength.

1. Lightweight block shall be provided where indicated on the drawings;

2. All other requirements shall be the same as listed above for normal weight block units.

2.3 MANUFACTURERS – FACE BRICK UNITS

A. Glen-Gery Corporation, Wyomissing, PA.

B. The Belden Brick Company, Canton, OH.

C. Watsontown Brick Company, Watsontown, PA.

D. Or equal.

2.4 FACE BRICK UNITS

A. Supply all samples for approval to ENGINEER and OWNER for final approvals.

B. Face Brick:

1. Existing Building Brick Replacement - ASTM C216, Type FBS, Grade SW; color to match existing colors, texture, and red blend of brick on existing pump station (Darlington - Oriental Jade No 108 with Medusa masonry cement No. 28b).

2. Building Addition Brick - ASTM C216, Grade SW. Design intent is for a smooth red and flashed red blend sympathetic to the existing red and flashed red brick on the existing building. Note that the red and flashed red portion brick comprises less than five percent of the existing façade areas. Proposed brick style sample boards must be compared against the existing building at the project site and approved by Owner. Examples of brick that may be considered to achieve the design intent are:

a. Belden Commodore Full Range Smooth.

b. Watsontown Atlantic Series, Bristol.

C. Size and Shape – Nominal modular size of 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long. Provide special units for 90-degree corners, lintels, and lipped.

D. Provide brick similar in texture, color, and all physical properties to those available for inspection as supplied on the approved sample panel. Certification and test data meeting ASTM C-216 must be submitted to Engineer for approval prior to installation.

E. Manufacturing brick plant must be within 500-mile radius of the project site.

2.5 FACTORY PREMIX MORTAR

A. Field mix mortar is not allowed.

B. Factory premixed mortar composed of mortar cement for load-bearing and reinforced masonry per Table 2 of ASTM C270, Type S property.

C. Factory premixed mortar for non-load-bearing masonry veneers per Table 2 of ASTM C270, Type N property.

D. Mortar Color - ASTM C979, Mineral oxide pigment; color as selected by ENGINEER to match existing pump station; manufactured by Solomon Grind-Chem Service, Inc.; Davis Colors; or equal.

E. Antifreeze compounds are prohibited.

F. Admixtures containing chlorides are prohibited.

G. Factory premix mortar is inclusive of all ingredients (including sand) except clear potable water for mixing.

1. Spec. Mix, Inc., Mendota Heights, MN (888) 773-2649.

2. Maxi-Mix, Inc., Brampton, Ontario, Canada (888) 822-3777.

3. Or equal.

2.6 GROUT

A. Grout for use in concrete masonry walls shall comply with ASTM C476 and shall develop a minimum compressive strength of 3,500 psi at 28 days.

B. Fine grout shall contain only fine aggregate.

C. Coarse grout shall contain fine and coarse aggregate.

D. Aggregates shall comply with ASTM C404.

E. Allowable Grout Pour Heights

GROUT TYPE	MAXIMUM GROUT POUR HEIGHT (FEET)	MINIMUM GROUT SPACE DIMENSIONS (IN. X IN.)
Fine	1	1-1/2 x 2
Fine	5	2 x 3
Fine	12	2-1/2 x 3
Coarse	1	1-1/2 x 3
Coarse	5	2-1/2 x 3
Coarse	12	3 x 3

1. Grout space dimension is the clear dimension between any masonry protrusions and shall be increased by the diameters of any horizontal bars within the grout space.

F. All grout shall be of fluid consistency with a slump of 8 to 10 inches.

G. Antifreeze compounds are prohibited.

H. Admixtures containing chlorides are prohibited.

2.7 MANUFACTURERS - REINFORCEMENT, ANCHORAGE, FLASHINGS, AND ACCESSORIES

A. Dur-O-Wal, Inc.; Hohmann & Barnard, Inc.; or equal.

2.8 REINFORCEMENT, ANCHORAGE, FLASHINGS, AND ACCESSORIES

A. Reinforcement, anchorage, flashings, and accessories to be as shown in the following table (provide listed manufacturer or equal):

COMPONENT	DUR-O-WALL ITEM	HOHMAN & BARNARD ITEM
Adjustable Veneer Tie and Horizontal Joint Reinforcement - Ladder configuration, 9 gage cross ties spaced 16 inches O.C.; 9 gage side rods, 3/16-inch eye and pintle wires, stainless steel.	D/A 3600 – Lite Duty Seismic Ladur-Eye, D/A 213 pintles with welded quake clip	Ladder Type #270
Self-Adhesive Flashing - Cross-laminated polyethylene sheet over rubberized asphalt, adhesive backed; 40 mils minimum total thickness.	Dur-O-Barrier-44 Flashing	Textroflash Flashing
Compressible Filler for Horizontal Joints - Closed cell neoprene sponge, 1/4-inch by 2-3/4-inch minimum or other dimensions as detailed, self-adhesive backing where beneficial for ease of construction.	D/A 2010 – Soft Joint	#NS – Closed Cell Neoprene Sponge
Compressible Filler for Vertical Joints - Closed cell neoprene sponge; thickness as detailed, width as needed to fill entire joint except for sealant depth.	D/A 2015 – Expansion Joint	#NS – Closed Cell Neoprene Sponge
Joint Stabilizing Anchor - Stainless steel with 3/16-inch rods, allowing movement parallel to wall.	D/A 2200 – Joint Stabilizing Anchor	#"Slip-Set" Stabilizer
Vertical Bar Positioner - Galvanized 9 gage wire to position vertical reinforcement at location in grouted cells as detailed	D/A 815, D/A 816, or D/A 817 – Rebar Positioners	#RB or #RB-Twin Rebar Positioners
Cavity Grout Support - Fabric mesh to block flow of grout below desired elevation, 1/2-inch maximum openings in mesh; non-corrosive fibers.	D/A 1015 - Dur-O-Stop	#MGS- Mortar/Grout Screen
Weep and Vent Inserts - Full height of head joint, polypropy-lene, multiple hexagon or round tube configuration, color gray.	D/A 1006 – cell Vents	#QV – Quadro-Vent
Mortar Drop Control Device - Staggered height plastic device designed to catch and suspend dripped mortar above weep height.	D/A 1007 – Mor-Control	# Mortar Net

B. Cleaning Solutions

1. Mortar and grout remover.

2. Efflorescence control system.

C. Vapor Barrier Mastic Adhesive - As specified in Section 07213.

2.9 MANUFACTURERS – ADMIXTURES AND COATINGS FOR CONCRETE MASONRY UNITS AND MORTAR

A. Grace Construction Products, Cambridge, MA.

B. Master Builders, Inc., Cleveland, OH.

C. Or equal.

2.10 ADMIXTURES AND COATINGS FOR CONCRETE MASONRY UNITS AND MORTAR

A. Water-Resistive Admixture For Concrete Masonry Veneer Units - DRY-BLOCK Block Admixture by Grace, Rhoemix Rheopel by Master Builders, or equal.

B. Water-Resistive Admixture For Mortar Used In Concrete Masonry Veneer – DRY-BLOCK Mortar Admixture by Grace, Rhoemix Rheopel Mortar Admixture by Master Builders, or equal.

C. Coating for brick and concrete masonry veneer.

D. Water Permeance Rating of Concrete Masonry Veneer – Class E per ASTM E514-74.

PART 2 EXECUTION

3.1 FIELD EVALUATION TESTING

A. Field testing shall be scheduled and paid for by the OWNER.

B. Tests Required

1. One set of samples for each building shall be collected when the concrete masonry exterior wall work for that building is approximately 25 percent complete, and a second set of samples shall be collected for each building when the concrete masonry exterior wall work for that building is approximately 75 percent complete. Samples shall be of the type and quantity required to perform the tests defined in paragraphs 3.1.D, E, and F below.

2. Where more than one CMU mix design or source, mortar mix design or source, or grout mix design or source; one additional test shall be performed for each revised or different material.

3. Tests performed on each set of samples shall include prism tests of CMU or brick prisms, plastic and hardened properties of mortar and compressive strength properties of grout.

C. Certified Laboratory

1. Testing will be performed by a laboratory employing technicians with a current “Certification in Concrete Masonry Testing” by the National Concrete Masonry Association.

2. A listing of certified laboratory technicians can be obtained by calling:
National Concrete Masonry Association
Phone: (703) 713-1900
Fax: (703) 713-1910
E-mail: ncma@ncma.org

D. Prism Test Method

1. Prism tests shall be performed in accordance with ASTM C1314. Provide copies of prism test results at 7 and 28 days.

2. The minimum acceptable prism test result shall be 1500 psi.

3. Prism tests require approximately 28 days to complete. CONTRACTORs should be organized to have CMU produced, prisms constructed and have tests scheduled and performed, so the testing lead time does not delay the schedule.

4. One prism test (three individual prism assemblies comprise one prism test) shall be performed for each reinforced CMU mix design to be used on this project.

5. It is acceptable to test one CMU size and configuration to be representative of the properties of CMU with different configurations, provided the manufacturer certifies that all said CMU were produced with the same materials, mix design, manufacturing process and curing method.

E. Mortar Testing

1. Perform mortar testing each day that masonry work is done or as determined by ENGINEER.

2. Establish batch-to-batch consistency by sampling three consecutive batches and test for plastic and hardened properties per ASTM C780. These tests include the following:

   a. Mortar-water content determination (ASTM C780, Annex A5).

   b. Mortar-air ratio (ASTM C780, Annex A6).

   c. Compressive strength tests (ASTM C780, Annex A7).

F. Grout Compressive Strength Testing

1. Grout compressive strength tests will be performed in accordance with ASTM C1019 by the CONTRACTOR per day on which grouting is performed or as determined by ENGINEER.

2. One grout sample (three specimens comprise one sample) shall be tested for each grout mix design to be used on this project.

3. The grout specimen shall be formed in a mold made from CMU that is identical to those that will be used at the grout location in the wall. Such CMU shall be sampled from the same lot and have the same configuration and dimension as CMU used for prism testing and C140 tests.

3.2 EXAMINATION

A. Ensure that field conditions are acceptable and ready to receive work.

B. Beginning of installation means installer accepts existing conditions.

C. New masonry work installed into or adjacent to existing conditions shall match existing construction, unless otherwise instructed.

D. Items provided by other sections shall be properly sized and located.

E. Ensure that built-in items are in proper location, and ready for roughing into masonry work.

3.3 PREPARATION

A. Direct and coordinate placement of metal anchors or reinforcing supplied by other sections.

B. Provide bracing of masonry construction. Maintain in place until building structure provides permanent bracing.

3.4 FACTORY PRE-MIX MORTAR

A. Factory premix mortar requires strict adherence to manufacturer's instructions and recommendations.

B. Hand mixing of mortars is not allowed.

3.5 TOLERANCES

A. Site tolerances per ACI 530.1 apply, with the following exceptions:

Dimension of Elements	
Mortar Joint Thickness Head Collar	 $\pm$1/8 inch $\pm$1/8 inch
Grout space or cavity width or per unit manufacturer's recommendation (for glazed masonry units)	-1/4 inch, + 3/8 inch

3.6 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain courses to uniform dimension.

C. Form bed and head joints of uniform thickness.

D. Lay load bearing concrete masonry units in running bond.

1. Coursing – One unit and one bed joint to equal 8 inches.

E. Lay glazed concrete masonry veneer units (decorative accent band) in running bond, matching scores and joints.

1. Coursing – One unit and one bed joint to equal 8 inches.

F. Lay brick units in running bond.

1. Coursing - Three units and three bed joints to equal 8 inches.

G. Mortar Joints Exposed to View - Tooled concave.

H. Cut mortar joints flush where below grade wall tile is applied, cement parging is applied, resilient base is applied, cavity insulation is applied, or bitumen dampproofing is applied.

3.7 PLACING AND BONDING

A. Where glazed masonry units are used, draw blocks from more than one pallet at a time during installation.

B. Lay first course in full bed of mortar.

C. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

D. Lay hollow masonry units with full face shell mortar coverage on head and bed joints.

E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

F. Buttering corners of joints or excessive furrowing of mortar joints are prohibited.

G. Remove excess mortar as Work progresses and provide full joinery to prevent moisture intrusions.

H. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Units with broken corners or edges shall not be used in exposed work.

1. Cut glazed units with motor-driven masonry saws with abrasive or diamond blade.

I. Return facing wythe against back-up wythe closing cavity off at all jamb openings. Install 1/2-inch thick compressible filler and sealant at joint between facing and back-up wythes.

J. Interlock external corners.

K. Isolate masonry partitions from vertical structural steel framing members with movement joint.

L. Isolate non-bearing masonry partitions from structure above with compressible filler or as indicated on Drawings.

M. Unfinished Masonry - Protect at day’s end with secured weatherproof covers. Step back for joining new work, no toothing permitted. Remove loose mortar, expose joint, and wet masonry only as required by ACI 530 and ACI 530.1.

N. Replace frozen mortar at CONTRACTOR’s expense.

3.8 VENTS AND WEEPS

A. Install cavity vents in exterior wythe at 16 inches on center horizontally at top of cavity wall air space.

B. Install cavity weeps in exterior wythe at bottom of cavity wall air space and above through-wall flashing; align with vents above.

C. Install cavity weeps above lintels, shelf angles, and other through-wall flashing locations.

3.9 CAVITY AND SINGLE WYTHE WALLS

A. Build inner wythe ahead of outer wythe.

B. Install insulation between horizontal joint reinforcing and hold in place with mastic adhesive and pintles.

1. Apply full coverage mastic adhesive to also act as vapor barrier.

C. Provide closure of air space for the full height of the wall cavity at building corners, utilizing insulation board.

D. Mortar shall not accumulate in cavity air space or plug cavity weeps. Install mortar drop control device per manufacturer's instructions at base of cavity, above lintels, and at other locations recommended by manufacturer.

E. Bevel mortar bed joint next to airspace to reduce falling mortar.

F. Build interior masonry walls full height or as indicated on the Contract Drawings.

3.10 REINFORCEMENT AND ANCHORAGES

A. Provide bond beams, lintels, and vertically reinforced masonry as required by Contract Documents for all walls, interior and exterior, bearing and non-bearing.

B. Horizontal joint reinforcement shall be continuous; install 16 inches o.c.

1. Lap straight runs and prefabricated corners and tees 9 inches.

2. Place first row in second joint above foundation.

3. Place in first joint below top of walls.

4. In first joint, above and below openings:

a. Extend 16 inches each side.

5. Under bond beam.

C. Veneer ties shall be installed at maximum 16 inches o.c. vertically and horizontally. Place around perimeter of openings, within 12 inches of openings.

D. Bridge across control joints using joint stabilizing anchors at 32 inches o.c. vertically.

E. Connect new to existing masonry using joint stabilizing anchors. Anchors shall be bent to form a 90-degree "L". The stationary leg shall be fastened to the existing wall.

F. Connect interior masonry and exterior concrete wall or existing construction using joint stabilizing anchors at 32 inches o.c., set in grout filled cavities supported by cavity grout support.

3.11 GROUTED AND REINFORCED COMPONENTS

A. Grout for bond beams, pilasters, etc., as specified in Part 2.

B. Lay masonry units with core cells vertically aligned, unobstructed and clear of mortar.

C. Reinforcing steel per notes.

D. Retain vertical reinforcement in position at top and bottom of cells. Splice reinforcement per notes.

E. Consolidate grout without displacing reinforcing.

F. When grouting is stopped for more than one hour, terminate grout 1-1/2 inches below top of upper masonry unit to form a positive key.

G. Low Lift Grouting - Place first lift of grout to 16 inches height, rod and vibrate for consolidation. Place subsequent lifts in 8-inch increments, rod and vibrate for consolidation.

H. High Lift Grouting

1. Provide cleanout opening no less than 4 inches high at bottom of each grouted cell by cutting one face shell of masonry unit. Space cleanouts 32 inches o.c., maximum, in solid grouted masonry.

2. Clean out masonry cells with high pressure water spray prior to grouting and permit complete water drainage.

3. After inspection by OWNER's representative, seal openings with masonry units.

4. Pump grout into spaces with tremie. Maintain water content in grout to intended slump without aggregate segregation.

5. Limit grout lift to 48 inches, rod and vibrate for consolidation. Wait 30 to 60 minutes before placing next lift.

I. Grout Slump Test - Test slump of each batch of grout produced. Submit test results to OWNER's representative within 24 hours of each test.

3.12 MASONRY FLASHINGS

A. At a height of no less than 8 inches above the top of foundation wall or steel lintel, install self-adhesive flashing as masonry is laid up so that flashing extends a minimum of 4 inches into the wall as measured from the outside face of the wythe. Self-adhesive flashing shall then extend downward over the outside face of the masonry, then horizontally over the top of foundation wall or steel lintel. Flashing shall be brought out to the face of masonry veneer, and then neatly trimmed back to the outside edge of foundation wall or steel lintel.

B. Turn flashing up 8 inches at columns, 2 inches minimum at vertical masonry joints, 4 inches minimum each side of masonry openings to form dam at termination of horizontal flashing.

C. Provide flashings at other locations as detailed or as required to construct a weather tight wall.

3.13 LINTELS

A. Provide reinforced concrete masonry unit lintels over openings where steel or precast concrete lintels are not indicated or specified in Contract Documents.

1. Set in mortar beds at proper elevation.

2. Use 8-inch deep lintel block units with solid bottoms.

3. Do not splice reinforcing bars.

4. Maintain minimum 8-inch bearing on each side of opening.

    a. Provide bond break where indicated on Drawings.

3.14 MOVEMENT JOINTS

A. Movement joints shall be classified and installed using the following:

1. Veneer Expansion Joint - Separates masonry veneer into segments to prevent cracking.

2. Masonry Control Joint - Separates concrete masonry into segments to prevent cracking due to movement. Stabilizing anchors are to be installed across joints to maintain alignment between segments.

3. Building Expansion (Isolation) Joint - Through-the-building joint that separates the building into discrete sections, so that stresses developed in one section do not affect the integrity of the entire structure.

B. Install movement joints as specified or detailed at locations indicated on Drawings.

C. Do not continue horizontal joint reinforcement through movement joints, except at bond beams.

D. Do not bridge control joint with mortar.

E. Movement joints shall be constructed as a continuous vertical line from the foundation to the top of the wall, interrupted only by bond beams. Movement joints shall be continued throughout parapet walls.

3.15 BUILT-IN WORK

A. Fill metal door frames solid with mortar where indicated by door schedule or details.

B. Embed items furnished by other sections where indicated on Drawings or specified.

C. Embed anchor bolts and plates solidly in grout where indicated on Drawings.

D. Coordinate spacing and placement of built-in items with other trades.

E. Place items plumb, level, or in proper alignment for their intended use.

3.16 REPOINTING

A. Cut out loose or disintegrated mortar in joints to a minimum depth that is twice the joint width or until sound mortar is reached.

B. Do not use power tools.

C. Do not damage masonry units.

D. When cutting is complete, remove dust and loose material by brushing, with water jet, or with air jet.

E. Pre-moisten joint and apply Type N mortar.

1. Proportion Portland cement, lime, and sand in a 1:1:6 ratio.

F. Pack mortar tightly in maximum 1/4-inch layers. Form smooth, compact joint to match existing.

G. As work proceeds and on completion, remove excess mortar, smears, droppings, and clean surrounding surfaces.

H. Moist cure for 72 hours.

3.17 MORTAR QUALITY CONTROL

A. Adhere to the following:

1. Retain the same material sources throughout project.

2. Consistent proportions of all components, particularly water-premix ratios.

3. Minimal re-tempering to avoid color variations and structural weakening

4. No acid cleaning. Excessive or too early cleaning of any kind may damage mortar.

5. Tool thumbprint hard joints; too soft a joint will lighten mortar color and to hard a joint will darken color.

6. Unused mortar shall be discarded within 2-1/2 hours after initial mixing except that unused mortar for glass unit masonry shall be discarded within 1-1/2 hours after initial mixing.

3.18 CUTTING AND FITTING

A. Cut and fit for chases, pipes, conduit, sleeves, grounds, and pilasters. Coordinate with other Sections of work to provide correct size, shape, and location.

B. Obtain ENGINEER’s approval prior to cutting or fitting masonry work where not indicated, or where appearance or strength of masonry work may be impaired.

3.19 CLEANING

A. Remove excess mortar and mortar smears without degrading mortar bond integrity.

B. Replace defective mortar and masonry units.

C. Clean soiled and effloresced surfaces.

D. Use non-metallic tools in cleaning operations.

E. Clear coat with spray applied breathable sealer on all exterior masonry following cleaning.

F. Cleaning of Face Brick shall be as per guidelines from manufacturer and BIA Technical Note 20, revised II. All cleaning practices and product use shall also be in accordance with cleaning agent manufacturers printed instructions. Installer to submit for approval all proper cleaning procedures from brick manufacturer prior to cleaning Face Brick.

3.20 PROTECTION OF FINISHED WORK

A. Without damaging completed work, provide protective boards at exposed external corners and surfaces, which may be damaged by construction activities.

END OF SECTION

SECTION 05140

STRUCTURAL ALUMINUM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. The requirements of materials and workmanship related to the fabrication of aluminum structures and appurtenances including but not limited to:

1. Aluminum Grating.

2. Aluminum Railings.

3. Aluminum Stairways.

4. Aluminum Framing and Supports.

1.2 REFERENCES

A. Aluminum Association, Inc. (AA): Aluminum Design Manual (ADM).

B. American Architectural Manufacturers Association (AAMA):

1. 603.8 - Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.

2. 605.2 - Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.

3. 606.1 - Voluntary Guide for Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum.

4. 607.1 - Voluntary Guide for Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.

5. 608.1 - Voluntary Guide Specifications and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.

C. American Society for Testing and Materials (ASTM):

1. B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings.

2. B85 - Standard Specification for Aluminum-Alloy Die Castings.

3. B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

4. B210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.

5. B211 - Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire.

6. B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

7. B308 – Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.

D. American Welding Society, Inc. (AWS):

1. A2.1 - Welding Symbols.

2. D1.2 - Structural Welding Code - Aluminum.

1.3 PROGRESS SUBMITTALS

A. Shop Drawings: Take measurements at the Site to confirm dimensions prior to Shop Drawings preparation. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details.

B. Design Data for Connections: Provide drawings bearing the seal and signature of a professional engineer licensed in New York State. Connections shall be approved for Seismic Design Category D applications.

C. Indicate welded connections using standard AWS A2.1 welding symbols. Indicate net weld lengths.

D. Welder Certificates: Certificates of qualification for welders employed on the Works, verifying AWS qualification within the previous 12 months.

E. Mill Test Reports: Submit 2 test reports on metal material if requested by ENGINEER.

1.4 QUALITY ASSURANCE

A. Perform work of this Section in accordance with AA ADM and the New York State Building Code.

B. Qualify welding processes and welding operators in accordance with AWS standards.

C. Where welding is required of metals and requiring special techniques, certification shall include the welding of such metals and using such techniques and verification of welding procedures to the satisfaction of ENGINEER. Certification for welding of aluminum shall be to AWS standards.

1.5 QUALIFICATIONS

A. Fabricator: Company specializing in performing the work of this Section with minimum 5 years documented experience.

B. Erector: Company specializing in performing the work of this Section with minimum 5 years documented experience.

C. Design connections not shown on the Drawings under direct supervision of a professional structural engineer experienced in design of this work and licensed in New York State.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Transport and deliver metal fabrications using methods and equipment such that fabricated parts are not stressed beyond specified limits.

B. Store fabricated parts on skids or supports to prevent damage to paintwork and/or coatings.

C. Lift fabricated parts at points, which will not cause overstress to material or damage paintwork or coatings.

PART 2 PRODUCTS

2.1 MATERIALS

A. Extruded Aluminum: ASTM B308, Alloy 6061, Temper T6.

B. Sheet Aluminum: ASTM B209 Alloy 6061, Temper T6.

C. Aluminum-Alloy Bars: ASTM B211, Alloy 6061, Temper T6.

D. Aluminum Tube and Pipe: ASTM B429, Alloy 6061, Temper T6.

E. Welding Materials: AWS D1.2, type required for materials being welded.

F. Grating: Aluminum grating, serrated non-skid surface, banded, Type SG, size as shown on the Drawings, complying with National Association of Architectural Metal Manufacturers.

G. Bolts, Nuts, and Washers: Type 316 Stainless steel.

H. Grout: non-shrink, non-metallic

2.2 FABRICATION

A. Tolerances: A fabricated member shall not vary from straight or from its intended curvature by more than its length divided by 960.

B. Fit and shop assemble items in largest practical sections for delivery to the Site.

C. Fabricate items with joints tightly fitted and secured.

D. Continuously seal joined members by continuous welds.

E. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Reduce exposed edges to small uniform radius.

F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

G. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

H. Grating: Provide continuity in spacing and location of bearing and cross bars throughout entire run of grating to produce overall uniform appearance.

2.3 FINISHING - ALUMINUM

A. Exterior Aluminum Surfaces: Exterior anodized to match color of existing structure, to 0.007 inch thickness.

B. For all aluminum surfaces to be placed adjacent to steel or concrete, clean per SSPC-SP 16 and apply two coats (8-16 mil DFT) of tar epoxy designed to inhibit galvanic corrosion, such as Targuard Coal Tar Epoxy by the Sherwin-Williams Company or approved equal. Clean substrate and apply per manufacturer's instructions.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. Clean aluminum where Site welding is required.

B. Do not embed aluminum products into cementitious materials due to inevitable corrosion deterioration.

3.3 INSTALLATION

A. Install metal fabrications in accordance with AA ADM specifications and reviewed Shop Drawings.

B. Install items plumb and level, accurately fitted, and free from distortion or defects.

C. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Do not field weld components without obtaining written approval of the ENGINEER.

E. Perform field welding in accordance with AWS D1.2.

F. Obtain approval prior to Site cutting or making adjustments not scheduled.

G. Grout under base plates with non-shrink grout to achieve full plate bearing. Trowel grouted surface smooth, splay neatly to 45 degrees.

H. Grating: Use manufacturer's approved fasteners or saddle clips.

3.4 EMBEDDED PARTS

A. Set metal fabrications to be embedded in concrete to conform to dimensions and locations shown on the Drawings.

B. Rigidly secure embedded parts during concrete operations to ensure proper location.

C. Correct displacement, whether caused by movement of forms or movement of metal fabrications relative to the forms or otherwise, to their specified location.

D. Methods used to secure embedded parts in position and to ensure that they are held in their required position will be subject to review by ENGINEER.

E. Coordinate installation of embedded parts with Section 03300.

3.5 TOLERANCES

A. Maximum Variation from Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset from True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

3.6 FIELD QUALITY CONTROL

A. Evaluation of quality of metal fabrications installation will be the responsibility of ENGINEER. Field quality control will be in accordance with AISC and AA standards.

B. The following tests will be performed by ENGINEER:

1. Bolt tightening in accordance with AISC recommendations for turn-of-nut tightening.

2. Welds in accordance with AWS standards for nondestructive testing.

END OF SECTION

SECTION 05210

STEEL JOISTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Open web steel joists and shear stud connectors, with bridging, attached seats and anchors.

B. Bearing plates and anchor bolts for site placement.

C. Supplementary framing for floor and roof openings greater than 18 inches and as indicated on the Contract Drawings.

1.2 REFERENCES

A. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel.

B. ASTM A 108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.

C. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

D. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.

E. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

F. ASTM E 165 - Standard Test Method for Liquid Penetrant Examination.

G. ASTM E 709 - Standard Guide for Magnetic Particle Examination.

H. AWS D1.1 - Structural Welding Code - Steel; American Welding Society.

I. SJI (SPEC) - Catalog of Standard Specifications and Load Tables for Steel Joists and Joist Girders; Steel Joist Institute.

J. SJI Technical Digest No. 9 - Handling and Erection of Steel Joists and Joist Girders; Steel Joist Institute.

1.3 SUBMITTALS

A. Shop Drawings: Indicate standard designations, joist coding, configurations, sizes, spacings, locations of joists, joist leg extensions, bridging, connections, and attachments.

B. Welders' Certificates: Submit manufacturer's certificates, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.4 QUALITY ASSURANCE

A. Design connections not detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed.

B. Perform Work, including that for headers and other supplementary framing, in accordance with SJI Standard Specifications Load Tables and SJI Technical Digest No.9.

C. Manufacturer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

D. Erector Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

1.5 DELIVERY, STORAGE, AND PROTECTION

A. Transport, handle, store, and protect products to SJI requirements.

B. Protect joists from distortion or damage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Steel Joists:

1. Vulcraft/Nucor Corporation: www.vulcraft.com.

2. Canam Buildings.

3. Or Equal.

2.2 MATERIALS

A. Open Web Joists: SJI Type KCS Joists:

1. Provide bottom and top chord extensions as indicated.

2. End bearing of 2-1/2 inches on steel supports, minimum.

3. Finish: Shop primed.

B. Anchor Bolts, Nuts and Washers: ASTM A 325, plain.

C. Structural Steel for Supplementary Framing and Joist Leg Extensions: ASTM A 36/A 36M.

D. Welding Materials: AWS D1.1; type required for materials being welded.

E. Primer: Shall be compatible with finishing material specified in Division 9.

2.3 FINISH

A. Shop prime joists.

1. Apply primer per requirements of Section 09900.

B. Prepare surfaces to be finished in accordance with Division 9.

2.4 DESIGN LOADS:

A. Bottom Chord joists loads shall be accommodated for equipment shown on Contract Drawings, and shall be accounted for in the steel joist designs:

1. Fan weights: 180 pounds.

2. Gas heaters: 55 pounds.

3. Electric heaters (located in the Fuel Tank Room and Electrical room): 140 pounds.

B. Joists shall also be designed for a continuous horizontal load of 200 pounds per linear foot (wind load), along the exterior of the building.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions prior to beginning work.

3.2 ERECTION

A. Erect joists with correct bearing on supports.

B. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment.

C. Coordinate placement of anchors in precast concrete construction for securing bearing plates, and angles.

D. After joist alignment and installation of framing, field weld joist seats to bearing plates and angles.

E. Position and field weld joist chord extensions and wall attachments.

F. Install supplementary framing for floor and roof openings greater than 18 inches.

G. Do not permit erection of decking until joists are braced bridged and secured or until completion of erection and installation of permanent bridging and bracing.

H. Do not field cut or alter structural members without approval of joist manufacturer.

I. After erection, prime welds, damaged shop primer, damaged galvanizing, and surfaces not shop primed.

3.3 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01420.

B. Welded Connections: Visually inspect all field-welded connections and test at least 10 percent of welds using one of the following:

1. Liquid penetrant inspection performed in accordance with ASTM E 165.

2. Magnetic particle inspection performed in accordance with ASTM E 709.

END OF SECTION

SECTION 05310

STEEL DECK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Roof deck.

C. Supplementary framing for openings up to and including 18 inches.

D. Bearing plates and angles.

1.2 RELATED SECTIONS

A. Section 05500 – Metal Fabrications

1.3 REFERENCES

A. ASTM A 653 Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Ally Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM A 1008/A 1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

C. AWS D1.1 - Structural Welding Code - Steel; American Welding Society.

D. AWS D1.3 - Structural Welding Code - Sheet Steel; American Welding Society.

E. SDI (DM) - Publication No.31, Design Manual for Composite Decks, Form Decks, Roof Decks; Steel Deck Institute.

F. SSPC-Paint 25 – Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II; Society for Protective Coatings.

1.4 SUBMITTALS

A. See specification 01331 for submittals procedures.

B. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, cellular raceways and outlet box locations, pertinent details, and accessories.

C. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.

D. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this Section with minimum five (5) years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Cut plastic wrap to encourage ventilation.

B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Steel Deck:

1. Vulcraft/Nucor Corporation: www.vulcraft.com.

2. New Millennium Building Systems.

3. Or approved Equal.

2.2 STEEL DECK

A. Roof Deck: Non-composite type, fluted steel sheet:

1. Galvanized Steel Sheet: ASTM A 653.

2. Primer: Shop coat of manufacturer's standard primer paint over cleaned and phosphatized substrate, primer conforming to ASTM A1008.

3. Minimum Metal Thickness, Excluding Finish: 18 gage unless indicated otherwise on the Plans.

4. Nominal Height: As indicated on the Plans.

5. Profile: Fluted SDI WR.

6. Minimum required deck connections:

a. 1.5B20 Decking:

1) 3 sidelap fasteners

2) 36/5 pattern fastener layout

3) #12 TEK Screws – support fasteners

4) #10 TEK Screws – sidelap fasteners

b. 1.5B16 Decking:

1) 3 sidelap fasteners

2) 36/4 Pattern – Fastener layout

3) #12 TEK Screws – support fasteners

4) #10 TEK Screws – sidelap fasteners

7. Roof Diaphragm design load: 200 pounds per linear foot (horizontal load).

2.3 ACCESSORY MATERIALS

A. Welding Materials: AWS D1.1.

B. Weld Washers: Mild steel, uncoated, 3/4-inch outside diameter, 1/8-inch thick.

C. Shop and Touch-Up Primer: SSPC-Paint 25, zinc oxide, complying with VOC limitations of authorities having jurisdiction.

2.4 FABRICATED DECK ACCESSORIES

A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 20-gage thick sheet steel; of profile and size as indicated; finished same as deck.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions prior to beginning work.

3.2 INSTALLATION

A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.

B. On concrete and masonry surfaces, provide minimum 4-inch bearing.

C. On steel supports, provide minimum 3-inch interior bearing and 1 ½ inch end bearing.

D. Fasten deck to steel support members at ends and intermediate supports at locations indicated on the Plans using minimum of anchorage indicated on plans.

E. Welding: Use fusion welds through weld washers.

F. Side lap connections (sheet to sheet):

1. See plans.

G. Weld deck in accordance with AWS D1.3.

H. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION

SECTION 05500

METAL FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. The requirements of materials and workmanship related to the fabrication of metal appurtenances including but not limited to:

1. Miscellaneous metal fabrications.

2. Miscellaneous framing and support.

1.2 RELATED SECTIONS

A. Section 01010 – Summary of Work.

1.3 SUBMITTALS

A. Submit the manufacturer's catalog Product Data Sheets for each and every product specified in this section.

B. Provide Shop Drawings for special assemblies and construction details as required by the ENGINEER. This includes, but is not limited to the following items:

1. Shop Drawings: Show fabrication and installation of all items, including plans, elevations, sections, details of components, joint locations and configurations within system and between system and construction penetrating it, termination details, and attachments to construction behind system.

2. Details of conditions unique to the Project. This includes details indicated on the Contract Drawings, details to address specific job conditions, or details, which the CONTRACTOR may propose to use which differ from those indicated on the Contract Drawings.

1.4 QUALITY ASSURANCE

A. Qualifications: The CONTRACTOR is to have satisfactorily performed work of similar scope on projects of similar type for a minimum of 5 years.

B. Regulatory Requirements: All work is to be completed in accordance with all the latest requirements of the following authorities and/or documents the most stringent requirements of which will apply:

1. American Institute of Steel Construction.

2. American Society for Testing and Materials.

3. American Welding Society.

4. New York State Building Code.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Site as required for use in a manner, which will not delay construction.

B. Store materials inside and under cover, keep them dry and protected from the weather, surface contamination, aging, corrosion, damage from construction traffic or other causes.

1.6 COORDINATION AND SCHEDULING

A. Coordinate fabrication schedule with construction progress to avoid delaying the work.

B. Notify other Contractors in advance of the work to provide them with sufficient time for the installation and coordination of items included in their contracts that must be installed in conjunction with the fabrications.

C. Supply anchorage items to be embedded in or attached to other construction without delaying the work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 PRODUCTS

2.1 MATERIALS

A. General: Provide materials with smooth, flat surfaces without blemishes.

B. Ferrous Metal as follows:

1. Steel W and WT shapes: ASTM A992, 50 ksi minimum yield stress.

2. Channels, angles, steel bars and Steel Plates: ASTM A 36/A 36M.

3. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

4. Rolled-Steel Floor Plate: Rolled from plate complying ASTM A 36/A 36M or ASTM A 283 Grade C or D.

5. Rolled-Stainless-Steel Floor Plate: ASTM A 793.

6. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless otherwise indicated.

7. Slotted Channel Framing: Cold-formed metal channels 1-5/8 by 1-5/8 with flange edges returned toward web and with 9/16-inches wide slotted holes in webs at 2 inches o.c. Channels made from galvanized steel complying with ASTM A 653, structural quality, Grade 33, with G90 coating; 0.079-inch nominal thickness.

8. Iron Castings: ASTM A 47, Grade 32510 malleable iron or ASTM A 48, Class 30 gray iron.

C. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27/ cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153.

D. Shop Primer for Ferrous Metal: Fast-curing, lead and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664 and compatible with finish coats of paint.

E. Shop Primer for Ferrous Metal: Organic zinc-rich primer, complying with SSPC-Paint 20 and compatible with topcoat.

F. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

G. Fasteners: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select Fasteners for type, grade, and class required.

H. Nonshrink, Nonmetallic Grout: Factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C 1107.

I. Concrete Fill: Comply with requirements in Section 03300 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-days compressive strength of 4,000 psi, unless otherwise indicated.

2.2 FABRICATION

A. Fabrication, General: Use connections that maintain structural value of joined pieces. Shear and punch metals cleanly and accurately. Remove burrs.

1. Weld corners and seams continuously. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercut or overlap. Remove welding flux immediately. Finish exposed welds smooth and blended.

2. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes.

3. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.

4. Bearing and Leveling Plates: Provide for steel items bearing on masonry or concrete. Drill plates to receive anchor bolts.

    a. Galvanize plates

5. Steel Lintels: Fabricate from shapes and to sizes indicated.

    a. Galvanize lintels located in exterior walls.

6. Miscellaneous Framing and Supports: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the work. Fabricate from structural steel of welded construction. Cut, drill, and tap units to receive hardware, hangers, and similar items.

    a. Where indicated to be cast into concrete or built into masonry, equip with integrally welded anchors at 24 inches o.c.

    b. Fabricate steel girders for wood frame construction from continuous steel shapes. Where wood nailers are attached to girders with bolts or lag screws, drill holes at 24 inches o.c.

    c. Fabricate steel pipe columns for supporting wood frame construction with steel baseplates and top plates welded to pipe with fillet welds the same size as pipe wall thickness.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of system. Proceed with installation of system only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General Requirements:

1. General: Provide anchorage devices and fasteners for securing metal fabrication to in-place construction. Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, with edges and surfaces level, plumb, and true.

2. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3. Fit exposed connections accurately together. Weld connections, unless otherwise indicated. Do not weld, cut, or abrade galvanized.

4. Set bearing and leveling plates on cleaned surfaces using wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts and pack with nonshrink, nonmetallic grout.

END OF SECTION

SECTION 06100

CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section defines the minimum requirements for the various types of the carpentry work required. This work includes, but is not limited to, the following:

1. Lumber for temporary protection.
2. Lumber for temporary support of masonry.
3. Lumber for protection of finished work.
4. Exterior grade plywood and wallboard.

1.2 RELATED SECTIONS

A. Section 04300 - Unit Masonry Systems.

1.3 REFERENCES

A. Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified.

1. American Lumber Standard Committee, National Grading Rule for Dimensioned Lumber PS-20.
2. American Wood Preservers Bureau Standard, LP-2.
3. Occupation Health and Safety Act.
4. Southern Pine Inspection Bureau, Grading Rules.
5. Western Wood Produces Association, Grading Rules.
6. American Lumber Standard Committee, Plywood Standard, PS-1.

1.4 QUALITY ASSURANCE

A. Design Criteria:

1. Lumber Standard: Comply with PS-20, except as otherwise noted.
2. New York State Uniform Fire Prevention and Building Code.

1.5 SPECIAL DELIVERY, STORAGE AND HANDLING

A. Lumber, General

1. Nominal sizes are shown, except as shown by detailed dimensions. Provide actual size as required by American Lumber Standard Committee, National Grading Rule for Dimension Lumber PS-20, for the moisture content specified for each use.

a. Provide dressed lumber, S4S, unless otherwise shown or specified.

b. Provide seasoned lumber with 15 percent maximum moisture content at time of dressing.

2. Provide the following grade and species:

a. Construction grade.

b. Douglas Fir, WWPA, or Southern Pine, SPIB.

B. Plywood: Douglas Fir, A-C, EXT-APA.

C. Lumber for Protection and Temporary Support: Size and grades to meet applicable requirements of the Occupational Safety and Health Act and structural requirements.

D. Fasteners and Anchorages: Provide size and type as shown or as recommended by applicable standards, complying with the applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices.

PART 2 MATERIALS – NOT USED

PART 3 EXECUTION

3.1 INSPECTION

A. CONTRACTOR and his installer must examine the substrates and supporting structure and the conditions under which the Work is to be installed, and notify the ENGINEER in writing of conditions detrimental to the Work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the ENGINEER.

3.2 INSTALLATION

A. General

1. Discard units of material which defects might impair the quality of the Work, and units which are too small to fabricate the Work with minimum joints or optimum joint arrangement.

2. Set carpentry work accurately to required levels and lines, with members plumb and true and accurately cut and fitted.

3. Securely attach carpentry work to substrates by anchoring and fastening as shown and as required by recognized standards. Countersink nail heads on exposed rough carpentry work and fill holes. Use common wire nails, except as otherwise shown. Make tight connections between members. Install fasteners without splitting wood, pre-drill as required.

END OF SECTION

SECTION 07213

BOARD INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Board insulation and vapor barrier at wall construction.

1.2 REFERENCES

A. ASTM C208 - Insulating Board (Cellulosic Fiber), Structural and Decorative.

B. ASTM C 240 - Standard Test Methods of Testing Cellular Glass Insulation Block.

C. ASTM C 552 - Standard Specification for Cellular Glass Thermal Insulation.

D. ASTM C 578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

E. ASTM C 612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.

F. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

G. ASTM C728 - Perlite Thermal Insulation Board.

H. ASTM D 2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.

I. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

J. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.

K. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.

L. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association.

M. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.

1.3 SUBMITTALS

A. See Section 01331 – Shop Drawing Procedures, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Materials of This Section: Provide continuity of thermal barrier at building enclosure elements.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.1 BOARD INSULATION MATERIALS

A. Extruded Polystyrene Board Insulation: ASTM C 578; Extruded polystyrene board with cut cell surfaces; with the following characteristics:

1. Board Size: 48 by 96 inches.

2. Board Thickness: As specified on the Drawings.

3. Board Edges: Square for installation in masonry cavity walls; tongue-and-groove edges for installation on perimeter foundation walls.

4. Thermal Conductivity (k factor) at 25 degrees F: 0.18.

5. Compressive Resistance: minimum- 25 psi.

6. Board Density: minimum- 1.3 lb/cu ft.

7. Water Absorption, maximum: 0.3 percent, volume.

8. Manufacturers:

a. Dow Chemical Co: www.dow.com.

b. Owens Corning Corp: www.owenscorning.com.

c. DiversiFoam Products.

2.2 ACCESSORIES

A. Sheet Vapor Retarder: As specified on the Drawings.

B. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation and adhesive.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.2 BOARD INSTALLATION

A. Apply adhesive to back of boards:

1. Three continuous beads per board length.

B. Install boards to fit snugly between wall ties.

C. Install boards horizontally on walls.

1. Place boards to maximize adhesive contact.

2. Install in running bond pattern.

3. Butt edges and ends tightly to adjacent boards and to protrusions.

D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.3 PROTECTION OF FINISHED WORK

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07505

EPDM MEMBRANE ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnish and install EPDM membrane roofing system on new metal and existing concrete plank deck, including but not limited to:

1. Removal of the entire existing roofing system, insulation, and flashing down to the existing concrete plank deck at the existing valve house and pump station.

2. Preparation of roofing substrates.

3. New dimensional and engineered lumber blocking at roof perimeters and openings.

4. 1/2-inch gypsum substrate board adhered to deck in ribbons adhesive (metal deck only).

5. Self-adhesive vapor retarder.

6. Tapered and flat polyisocyanurate insulation and crickets, minimum R-value of 30, adhered in ribbons of insulation adhesive.

7. 1/2-inch gypsum cover board adhered in ribbons adhesive.

8. Fully-adhered EPDM membrane roofing and flashing system.

9. Metal flashings, counter flashings, new and retrofit roof drains, scuppers/downspouts, and miscellaneous accessories as required.

B. Disposal of demolition debris and construction waste is the responsibility of CONTRACTOR. Perform disposal in manner complying with all applicable federal, state, and local regulations.

C. Comply with the published recommendations and instructions of the roofing manufacturer.

D. CONTRACTOR shall be responsible for all costs associated with any variations to accommodate manufacturers other than that identified as the basis of design.

1.2 RELATED SECTIONS

A. Section 01010 - SUMMARY OF WORK

1.3 REFERENCES

A. NRCA Roofing and Waterproofing Manual.

B. ASTM Standards.

C. FMG Standard Specifications.

D. Underwriter’s Laboratories (UL).

1.4 QUALITY ASSURANCE

A. Contractor Qualifications: Roofing installer shall have the following:

1. Certified Licensed Contractor for the system to be installed.

2. At least 5 years' experience in installing specified system.

B. Manufacturer Qualifications: Manufacturer shall demonstrate a minimum 10-year track record of successful production and application of roofing systems.

C. Roofing Inspector Qualifications: A full-time technical representative with a minimum 5 years' experience in commercial roofing of the manufacturer experienced in the installation and maintenance of the specified roofing system and qualified to perform roofing observation and inspection specified in Field Quality Control Article, shall determine the CONTRACTOR's compliance with the requirements of this Project.

D. Provide installer's field supervision. CONTRACTOR shall maintain full-time supervisor/foreman on job-site during times that roofing work is in progress. Supervisor must have a minimum of 5 years' experience in roofing work similar to nature and scope of specified roofing.

E. Source Limitations: Obtain roofing system components from or approved in writing by roofing system manufacturer.

F. General Performance: Installed membrane roofing and flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and flashings shall remain watertight.

G. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.

H. EPDM Roofing System Classification: UL Class A / Uplift Resistance 90 psf.

I. Flashings and Fastening: Provide base flashings, perimeter flashings, detail flashings, scuppers/downspouts, and component materials and installation techniques that comply with requirements and recommendations of the following:

1. FMG 1-49: Loss Prevention Data Sheet for Perimeter Flashings.

2. NRCA Roofing and Waterproofing Manual (Fifth Edition) for construction details and recommendations.

3. SMACNA Architectural Sheet Metal Manual (Fifth Edition) for construction details.

4. The metal coping/edge securement shall be installed as tested in accordance with the most current version of the ANSI\SPRI ES-1, American National Standard for Edge Systems Used with Low-Slope Roofing Systems.

J. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.

K. Documents and Samples at Site: Contractor is to maintain one set of record documents on Site.

1.5 SUBMITTALS

A. Submit submittals in accordance with Conditions of the Contract as specified in Section 01300.

B. Product Data:

1. Provide manufacturer's printed data sufficient to show that all components of roofing system comply with the specified requirements and with the manufacturer's requirements and recommendations for the system type specified; include data for each product used in conjunction with roofing system.

2. Where UL requirements are specified, provide documentation that shows that the roofing system to be installed is UL-Classified, as applicable; include data itemizing the components of the classified or approved system.

C. Samples: Submit samples of each product specified.

D. Shop Drawings:

1. Provide insulation plan and roofing system plan and details.

2. Provide shop drawings showing installer’s proposed details for the specific conditions of this Project.

E. Manufacturer Letter. Letter signed by roofing manufacturer certifying that roofing system complies with specified requirements including UL approvals, and that roofing system will be eligible for the specified warranty.

1. Submit shop drawings and product data to the roof membrane manufacturer for prior to forwarding for Engineer’s review. Manufacturer’s letter must reference this specific project, describe the systems and materials proposed for installation, and acknowledge review of shop drawings and product data.

F. Warranties: Sample of manufacturer’s warranties as specified.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project Site in original containers with seals unbroken and labeled with manufacturer’s name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be used within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer’s written instructions for handling, storing, and protecting during installation.

D. Do not leave unused sheet materials on the roof overnight or when roofing work is not in progress unless protected from weather and moisture and unless maintained at a temperature exceeding 60 degrees F.

E. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

F. Contractor is responsible for the safekeeping of materials stored on Site.

1.7 PROJECT CONDITIONS

A. Project drawings are intended for orientation, approximate configuration, and location of details. Contractor shall field verify all items and dimensions for bidding and installation purposes.

B. Roof Loading: Loads placed on the roof, including storage of materials, shall not exceed the safe load for which the roof deck and structure is designed.

C. Safety: It is the Contractor's responsibility to ensure safety at all times. The Contractor must exercise care and observe appropriate fire safety precautions. The Contractor is to comply with all local and OWNER safety and fire safety requirements. Contractor is to erect barricades and cordon off work areas, as needed, to provide for the safety of building occupants, pedestrians, etc.

D. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

E. Prevent dust, vapors, gases, and odors from entering into the building during roof installation. Coordinate these procedures with OWNER.

1.8 WARRANTY

A. Warranty, General: Warranties specified shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Select Manufacturer's Total System Roofing Warranty: Submit a written non pro-rated no dollar limitation warranty, signed by the roofing system manufacturer agreeing to repair any leaks in the roof membrane system resulting from defects in materials, workmanship, and manufacturer standard limited accidental puncture coverage including, but not limited to, substrate boards, vapor retarders, insulation, fasteners, fastening plates, and edgings must be manufactured and/or supplied by the roofing system manufacturer and covered by the warranty.

1. Warranty Period: 20 years from date of Substantial Completion.

2. Indicate a peak wind gust speed warranty of 90 M.P.H. at 10 meters above ground level.

3. Inspections required by the manufacturer to provide warranty shall be performed at no cost to the OWNER.

4. Upon successful completion of the work and prior to receipt of final payment, the manufacturer's warranty as stated above shall be issued to the OWNER.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Approved manufacturers:

1. Carlisle Syntec (basis of design).

2. Firestone.

3. Or approved equal.

2.2 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

A. Roof Membrane.

1. Minimum .060-inch thick reinforced EPDM. The membrane shall conform to the minimum physical properties of ASTM D4637, or equal. When a 10-foot-wide membrane is to be used, the membrane shall be manufactured in a single panel with no factory splices to reduce splice intersections with 6-inch factory applied tape.

B. Substrate Board.

1. Gypsum Fiber roof board: ASTM C1278, or equal, 1/2-inch thick.

a. VapAir Seal 725TR by Carlisle Syntec Systems.

b. V-Force Vapor Barrier Membrane by Firestone.

c. Or equal.

C. Vapor Barrier.

1. Minimum total thickness of 40 mils of a self-adhering membrane. Vapor retarder must have a perm rating of 0.05 or less as per ASTM D1970. Vapor retarder must be rated by the manufacturer for allowable exposure to the elements for a minimum 30 days.

a. DensDeck Prime by Georgia-Pacific.

b. USG Securock by United States Gypsum Company.

c. Or equal.

D. Roof Insulation.

1. General: Provide tapered insulation system (existing concrete plank deck) and crickets with a minimum R value of 30 and a minimum slope of 1/8 per ASTM C1289-06, (LTTR). Insulation transitions/step offs greater than 1/2 inch will require a transition board such as a wood fiberboard tapered edge strip.

2. Polyisocyanurate Board Insulation: ASTM 1289-06 Type II, Class 2, Grade 3, 25 PSI minimum.

E. Cover Board.

1. Gypsum Fiber roof board: ASTM C1278, or equal, 1/2-inch thick.

a. DensDeck Prime by Georgia-Pacific.

b. USG Securock by United States Gypsum Company.

c. Or equal.

F. Wood Blocking.

1. Preservative-Treated Lumber: Southern Pine No. 2; minimum F_b for single use up to 6-inch wide: 1,250 psi; E = 1,600,000 psi; 19 percent maximum moisture content.

   a. Provide preservative treated lumber wherever lumber is in contact with concrete or masonry.

   b. Provide preservative treatment without arsenic or chromium: Wolmanized EraWood, ACQ or Micronized Copper and Quaternary (MCQ) "Micropro," or equal.

   c. Retention as required to meet AWPA Standard U1 for the appropriate Use Category, or in accordance with the applicable ICC ES ESR.

   d. Provide lumber that has been kiln-dried after preservative treatment.

2. Engineered Lumber: Laminated Veneer Lumber (LVL) with 2,600 psi minimum F_b and 2.0 x 10^6 psi minimum E.

   a. Provide engineered lumber where shown on the contract drawings. Engineered lumber need not be preservative treated if continuously isolated from masonry or concrete by insulation, vapor retarder or air/vapor barrier (AVB).

   b. LP SolidStart by Louisiana-Pacific Corporation.

   c. Versa-Lam 2.1E by Boise Cascade Company.

   d. 2.0 E Microllam by Weyerhaeuser.

   e. Or equal.

3. Provide only stainless steel fasteners for use with dimensional lumber or engineered lumber in connection with roofing assemblies.

G. Adhesives and Cleaners.

1. General: All products shall be furnished by the membrane manufacturer and specifically formulated for the intended purpose. All primers and adhesives must comply with NYS VOC OTC regulations.

   a. Bonding Adhesive: Cav Grip III.

   b. Splice Tape and Primer: Sure-Seal 6-inch SecurTAPE and Low VOC EPDM Primer.

   c. Cleaning Solvent: Sure-Seal Weathered Membrane Cleaner.

   d. External seam sealant: Sure-Seal Lap Sealant.

   e. Sealer: Sure-Seal Pourable Sealer.

      1) Wadding and Overlayment adhesive: Sure-Seal Flexible FAST Adhesive (Insulation adhesive must be VOC free) Insulation adhesive must have a nominal free-rise core density of 2.2 pound per cubic foot, and be a two-part low rise foam adhesive. (Ribbon method adhesives are acceptable. Bead spacing shall be 6 inches on center in the field, and 4 inches on centers in the perimeters and corners.)

H. Fasteners and Plates.

1. General: To be used for mechanical attachment of materials and to provide additional membrane securement into walls, curbs, wood blocking, and roof decks where required:

   a. HP Fasteners: a threaded, black epoxy electro-deposition coated fastener used for steel and wood.

   b. Hammer Screw: an expansion anchor with stainless steel drive pin used for fastening the Sure-Seal Termination Bar or Seam Fastening Plates to concrete, brick, or block walls.

   c. HP 14-10 Fasteners: A #14 threaded fastener used for minimum 3,000 psi concrete.

   d. Seam Fastening Plates: a 2-inch diameter steel, FM approved metal plate used in conjunction with RUSS or with EPDM membrane for membrane securement.

   e. RUSS (Reinforced Universal Securement Strip): a 6- or 9-inch wide, 100-foot long strip of reinforced EPDM membrane.

      1) The 6-inch-wide RUSS shall be utilized horizontally or vertically (in conjunction with Seam Fastening Plates) below the EPDM membrane for additional membrane securement.

I. Metal Coping/Edging, scuppers. downspouts, and Terminations.

1. General: High performance metal roof coping/edge shall be certified by the metal roof edge manufacturer to comply with ANSI/SPRI Standard ES-1. Metal roof edge shall meet performance design criteria according to the following test standards at a minimum:

   a. ANSI/SPRI ES-1-98 Test Method RE-1 Test for Roof Edge Termination of Single-ply Roofing Membranes: The fascia system shall be tested to secure the membrane to a minimum 100 lbs/ft in accord with the ANSI/SPRI ES-1-98 Test Method RE-1. Use the current edition of ANSI/SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

   b. ANSI/SPRI ES-1-98 Test Method RE-2 Pull-Off Test for Fascia: The fascia system shall be tested in accord with the ANSI/SPRI ES-1-98 Test Method RE-2. Use the current edition of ANSI/SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

   c. FMRC Loss Prevention Data Sheet 1-49 “Perimeter Flashing.” The fascia product shall be listed in current Factory Mutual Research Corporation Approval Guide.

   d. Metal finish shall be minimum 70% PVDF meeting AAMA 2605.

2. Coping metal systems shall consist of a minimum 20 gauge galvanized retainer and .050-inch thick aluminum fascia. Metal fascia color shall be chosen by OWNER.

3. Edging metal systems shall consist of a minimum 20 gauge galvanized retainer and .050-inch thick aluminum fascia. Metal fascia color shall be chosen by OWNER.

4. Termination Bar: a 1-inch wide and .098-inch thick extruded aluminum bar pre-punched 6 inches on center; incorporate a sealant ledge to provide increased stability for membrane terminations.

5. Counter Flashing: Shall be shop formed as detailed on drawings from .040 Aluminum, color selected by OWNER.

6. Scupper/Downspouts: Shall be minimum 24-gauge aluminum, color selected by OWNER.

J. Roof Drains

1. Retrofit Drains for Existing Roof

a. Replace existing drains with retrofit units and new drains with spun aluminum and aluminum strainer type assembly units. Marathon, Thaler, OMG, or equal.

b. Sized to fit existing site conditions and pipe size and as noted on contract drawings for new drains.

2. Combination Primary and Overflow Drains for New Roof at Pump Station Addition

a. Provide cast iron body and dome primary and overflow drains with two-opening sump pan, four-inch tall static extensions, and secondary clamping collars.

b. Zurn Z164-E-SC, J.R. Smith 1850-E-C2, or equal.

c. Coordinate with roof drain leader pipe material and diameter shown on contract drawings.

K. Overflow Drain Outlet

1. Outlet nozzle with face of wall flange and perforated hinged flapper, powder coated aluminum. ZURN ZF199 Chameleon Downspout Nozzle or equal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, for compliance with the following requirements and other conditions affecting performance of roofing system:

1. Verify that roof openings, penetrations, and curbs are set and braced and that roof drain bodies are securely clamped in place.

2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

3. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16-inch out of plane relative to adjoining deck.

4. Verify that substrate is visibly dry and free of moisture.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

D. Coordinate work activities daily with OWNER. OWNER will occupy portions of building immediately below reroofing areas.

3.3 GENERAL INSTALLATION

A. Remove existing roofing membrane and other roofing system components down to the deck.

B. Install retrofit roof drains and aluminum drain strainers in strict accordance with the drain and roofing manufacturers' instructions.

C. Comply with recommendations in FMG Loss Prevention Data Sheet 1-49, including requirements for wood nailers and cants.

D. Coordinate installation of roofing system components so insulation and roofing plies are not exposed to moisture or remain exposed at the end of the workday or when rain is forecast.

E. Provide water cutoffs at the end of each day's work to cover exposed ply sheets and insulation with a course of coated felt with joints and edges sealed.

F. Complete terminations and flashings and provide temporary seals to prevent water from entering completed sections of the roofing system.

G. Roofing system and building shall be weather-tight at the end of each working day.

H. Remove and discard temporary seals before beginning work on adjoining.

I. Install roofing system in accordance with manufacturer's recommendations and warranty requirements.

J. Remove existing flashings around curbs, wall, and penetrations and clean substrates of dirt and debris.

K. Install roofing system in accordance with NRCA Manual Plates and NRCA recommendations; modify as required to comply with requirements of FMG references above.

L. Contractor shall erect all required roof barriers and safety lines as required by OSHA and comply with OSHA regulations for safety.

3.4 SUBSTRATE BOARD INSTALLATION

A. Install substrate board in low rise foam direct to deck. Application of the foam ribbons shall be on each high rib of deck.

3.5 VAPOR BARRIER INSTALLATION

A. Surfaces to be clean and dry. Prime all surfaces to receive the vapor retarder with a NYS VOC OTC compliant primer, Low VOC CCW-702 Primer or Cav-Grip. Apply the primer with a long nap roller at the applicable coverage rate noted above. At 75 degrees F allow primer to dry 1-hour minimum. If the Cav-Grip is being used, spray apply in a thin even coat of 2,000 square feet per cylinder. Apply Cav-Grip in a thin, even coat

to substrate. Avoid high thickness buildup. Keep spray gun perpendicular to surface during spray. Set time for the Cav-Grip should be approximately 5 minutes. Primers have a satisfactory cure when it will not transfer when touched. Prime only areas to be waterproofed the same day. Re-prime if area becomes dirty. Apply Vapor Barrier from low to high point, in a shingle fashion, so that laps will shed water. Overlap all edges at least 2-1/2 inches. End laps shall be staggered. Place membrane carefully so as to avoid wrinkles and fishmouths. Immediately after installation, roll with a 100-150 pound weighted steel roller.

3.6 INSULATION INSTALLATION

B. Comply with roofing manufacturer's written instructions for installing roof insulation.

C. Install flat stock insulation under area of roofing to conform to R-Value indicated.

D. Where overall insulation thickness is 2.7 inches or greater, install multiple layers with no individual layer exceeding 2.7 inches of thickness. All joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

E. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/8-inch with insulation.

1. Cut and fit insulation within 1/8-inch of nailers, projections, and penetrations.

F. Trim surface of insulation where necessary at roof drainage, so completed surface is flush and does not restrict flow of water.

G. Install adhered insulation crickets between drain locations, along walls and at high side of roof penetrations and curbs to ensure positive drainage.

H. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:

1. Secure all insulation with the FAST 100-LV Adhesive in accordance with the manufacturer's specifications and application procedures for a full spray application. Insulation adhesive must have a nominal free-rise core density of 2.2 pound per cubic foot, and be a two-part low-rise foam adhesive with 100 percent adhesion. (Ribbon method adhesives are acceptable. Bead spacing shall be 4 inches on center.)

3.7 COVER BOARD INSTALLATION

A. Install cover board in low rise foam. Application of the foam ribbons shall be 4-inch on center and installed on the cover board then flipped into place.

3.8 EPDM MEMBRANE INSTALLATION

A. Install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations.

B. Unroll and position membrane without stretching. Allow the membrane to relax for approximately 1/2 hour before bonding. Fold the sheet back onto itself so half the underside of the membrane is exposed.

C. Apply the Bonding Adhesive in accordance with the manufacturer's published instructions, to both the underside of the membrane and the substrate. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.

D. Install adjoining membrane sheets in the same manner, overlapping edges approximately 7 inches. Do not apply bonding adhesive to the splice area.

1. Membrane Splicing: 6-inch pre-applied Splice Tape.

2. Overlap adjacent sheets and mark a line 1/2-inch out from the top sheet.

3. Fold the top sheet back and clean the dry splice area (minimum 6-inches wide) of membrane with Sure-Seal Primer as required by the membrane manufacturer.

4. Apply Primer to the EPDM sheet. Press Membrane and tape onto the sheet using hand pressure.

5. Remove the release film and press the top sheet onto the tape using hand pressure.

6. Roll the seam toward the splice edge with a 2-inch wide steel roller.

3.9 FLASHING INSTALLATION

A. Wall and curb flashing shall be cured EPDM membrane. Continue the deck membrane as wall flashing where practical.

B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal coping/edging and roof drain applications.

3.10 WOOD BLOCKING INSTALLATION

A. Install wood blocking in accordance with FMG 1-49 requirements.

3.11 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to ENGINEER.

1. Notify OWNER and ENGINEER 48 hours in advance of date and time of inspection.

2. Results will be made available to OWNER’s representative in written form. Any defects or entrapped moisture found within the new roofing system installation will be removed and replaced at the installing Contractor’s expense.

B. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

C. Additional testing and inspecting, at Contractor’s expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.12 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Sequence operations to avoid excessive or concentrated foot traffic and storage over roof areas while they cure.

D. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 07840

FIRESTOPPING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. Furnish and install firestop systems consisting of a material, or combination of materials installed to retain the integrity of fire resistance rated construction by maintaining an effective barrier against the spread of flame, smoke and/or hot gases through penetrations, blank openings, construction joints, fire-resistive joints, and perimeter openings in or adjacent to fire-rated barriers in accordance with the requirements of the 2020 Building Code of New York State.

B. Firestop systems shall be used in locations including, but not limited to, the following:

1. Penetrations through fire resistance rated floor and roof assemblies requiring protected openings, including both empty openings and openings containing penetrants.

2. Penetrations through fire resistance rated wall assemblies including both empty openings and openings containing penetrants.

3. Membrane penetrations in fire resistance rated wall assemblies where items penetrate one side of the barrier.

4. Joints between fire resistance rated assemblies.

5. Perimeter gaps between rated floors/roofs and an exterior (rated and non-rated) wall assembly.

C. Provide firestopping and fire-rated joint materials and installation services wherever needed to maintain the integrity of fire resistance rated construction throughout the Project.

1. Firestop through-wall and top-of-wall conditions at the three hour rated wall between Fuel Tank Room PS-106.

2. Provide elastomeric firestop sealant and mineral fiber safing joints where shown on drawings for top of masonry wall conditions and masonry-wall-to-steel-roof-deck conditions throughout the Pump Station addition as shown by details on the contract drawings.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-in-Place Concrete.

B. Section 04300 - Unit Masonry System.

C. Section 05310 - Steel Deck.

D. Section 05210- Steel Joists.

E. Section 07900 - Joint Sealers.

F. Division 15 Sections – Mechanical, HVAC and Plumbing Systems.

G. Division 16 Sections - Electrical; Lighting, Power, Alarms, and Communications.

1.3 REFERENCES

A. American Society For Testing and Materials Standards (ASTM):

1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

2. ASTM E119 - Methods of Fire Tests of Building Construction and Materials.

3. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.

4. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Firestops.

5. ASTM E1399 - Test Method for Cyclic Movement and Measuring Minimum and Maximum Joint Width.

6. ASTM E1966 - Test Method for Resistance of Building Joint Systems.

7. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Fire Stops.

8. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-Story Test Apparatus.

9. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.

B. Underwriters Laboratories Inc. (UL):

1. UL 263 - Fire Tests of Building Construction and Materials.

2. UL 723 - Surface Burning Characteristics of Building Materials.

3. UL 1479- Fire Tests of Through-Penetration Fire Stops.

4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.

C. UL Fire Resistance Directory - Volume 2:

1. Through-Penetration Firestop Devices (XHJI).

2. Fire Resistive Ratings (BXUV).

3. Through-Penetration Firestop Systems (XHEZ).

4. Fill, Void, or Cavity Material (XHHW).

5. Perimeter Barrier (Fire Containment) System (XHDG).

6. Forming Materials (XHKU).

D. UL Building Materials Directory.

E. Omega Point Laboratories (OPL) - Directory of Listed Building Products, Materials & Assemblies, Volume II.

F. UL Qualified Firestop Contractor Program.

G. Warnock Hersey (WH) - Certification and Listings Directory.

H. NFPA - NFPA 101: Life Safety Code.

I. ICC – 2018 International Building Code (IBC).

1.4 DEFINITIONS

A. Firestopping - The use of a material or combination of materials in a fire-rated structure (wall or floor) where it has been breached, so as to restore the integrity of the fire rating of that wall or floor.

B. System - The use of a specific firestop material or combination of materials around a specific penetrant(s) or into a specific joint in conjunction with a specific wall and/or floor construction type.

C. Barrier - Any bearing or non-bearing wall or floor that has an hourly fire and smoke rating.

D. Through- penetration -Any penetration of a fire-rated wall or floor that completely breaches the barrier.

E. Membrane-penetration - Any penetration in a fire-rated wall that breaches only one side of the barrier.

F. Fire-Resistive Joint - Any gap, joint, or opening, whether static or dynamic, between two fire-rated barriers including where the top of a wall meets a floor; wall edge to wall edge configurations; floor edge to floor edge configurations; floor edge to wall configurations.

G. Perimeter Barrier - Any gap, joint, or opening, whether static or dynamic, between a fire-rated floor assembly and a non-rated exterior wall assembly.

H. Engineering Judgment - A firestopping assembly proposed for conditions where a tested and listed firestopping system does not exist

1.5 PERFORMANCE REQUIREMENTS

A. Penetrations - Provide and install through-penetration firestop systems that are produced to resist the spread of fire, passage of smoke and other gases according to requirements indicated, to restore the original fire-resistance rating of barrier penetrated.

1. Provide and install complete penetration firestopping systems that have been tested and approved by nationally accepted testing agencies per ASTM E814 or UL 1479 fire tests in a configuration that is representative of field conditions.

2. F-Rated Systems - Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E814 or UL 1479, but not less than one hour or the fire resistance rating of the barrier being penetrated.

3. T-Rated Systems - Provide through-penetration firestop systems with T ratings indicated, as well as F-ratings, as determined per ASTM E814 or UL 1479, where required by the Building Code.

4. L-Rated Systems - Provide through-penetration firestop systems with L ratings in addition to F and T ratings, as determined per UL 1479, where required by the Building Code.

5. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems (W-rated systems) as determined per UL 1479, where indicated.

6. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of piping insulation.

B. Fire-Resistive Joints - Provide joint systems with fire resistance assembly ratings indicated, as determined by UL 2079 (ASTM E1399 and E1966), but not less than the fire resistance rating of the construction in which the joint occurs. Firestopping assemblies must be capable of withstanding anticipated movements for the installed field conditions.

1. For firestopping assemblies exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.

2. For floor penetrations exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.

C. Building Perimeter Barrier (Fire Containment) Systems - Provide interior perimeter joint systems with fire resistance ratings indicated as determined per ASTM E2307, but not less than the fire resistance rating of the floor construction.

1. Provide products that upon curing, do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, ponding water or other forms of moisture characteristic during and after construction.

2. Provide sealants sufficiently flexible to accommodate movement such as thermal expansion, inter-story differential building sway and other normal building movement without damage to the seal.

3. Provide perimeter fire containment systems subjected to an air leakage test conducted in accordance with Standard, ANSI/UL2079 with published L-Ratings for ambient and elevated temperatures as evidence of the ability of the fire-resistive joint system to restrict the movement of smoke.

D. Firestopping products shall have flame spread ratings less than 25 and smoke-developed ratings less than 450, as determined per ASTM E84.

E. Where there is no specific third-party tested and classified firestop system available for a particular firestop configuration/condition, the firestopping contractor shall obtain from the firestopping material manufacturer an Engineering Judgment (EJ) or Equivalent Fire Resistance Rated Assembly (EFRRA) to be submitted to the approving authority and authority having jurisdiction for approval prior to installation. The EJ shall follow International Firestop Council (IFC) guidelines.

1.6 SUBMITTALS

A. Provide a single submittal that includes all systems, locations and penetrations that require use of products specified in this Section to maintain the integrity of fire-rated assemblies.

1. Submittals that are not comprehensive with respect to the firestopping and fire rated joint systems throughout the project will be returned without approval.

a. It is understood that additional submittals may be required for conditions that develop, or become apparent during construction.

B. Provide in accordance with Section 01331 (Submittals) and as supplemented herein. Submittals shall include, but not be limited to, the following:

1. Product Data - For each type of firestopping and/or barrier system product selected. Certify that firestopping materials are asbestos free and contain volatile organic compounds within limits of the local jurisdiction and are non-toxic to building occupants.

2. Design Listings - Submit system design listings, including illustrations, from a qualified testing and inspecting agency that is applicable to each firestop configuration.

3. Where there is no specific third party tested and classified firestop system available for a particular configuration, the firestopping contractor shall obtain from the firestopping material manufacturer an EJ or EFRRA for submittal.

4. Qualification Data - For firms and persons specified in Article 1.7 to demonstrate their capabilities and experience. Submit document from manufacturer wherein manufacturer recognizes the installer as qualified.

1.7 QUALITY ASSURANCE

A. Provide firestopping and/or perimeter barrier system design listings from UL or OPL in accordance with the appropriate ASTM Standard(s) per Article 1.05.

B. Contractor Qualifications - An acceptable installer shall meet any two of the following requirements:

1. Licensed by state or local authority where applicable.

2. Trained and approved by the firestop manufacturer.

3. Shown to have successfully completed not less than five comparable scale projects.

4. FM approved in accordance with FM Standard 4991, Approval of Firestop Contractors.

5. UL Qualified Firestop Contractor.

C. Single Source Limitations - Obtain firestop systems, for each kind of penetration and construction condition indicated from a single manufacturer, where possible.

D. Materials from different firestop manufacturers shall not be installed in the same firestop system or opening.

E. Firestopping material shall be asbestos-free and lead-free and shall not incorporate nor require the use of hazardous solvents.

F. Firestopping sealants must be flexible, allowing for normal movement of adjacent materials.

G. Firestopping materials shall not crack or pull back from contact surfaces such that a void is created.

H. Firestopping materials shall be moisture resistant, and may not dissolve in water after curing.

I. Materials used shall be in accordance with the manufacturer’s written installation instructions.

J. Label each firestopping system installation with the following information:

1. Firestopping product name.

2. System listing number.

3. Name and address of manufacturer

K. Inspection of penetrations through fire rated floor and wall assemblies shall be in accordance with ASTM E2174, Standard Practice for On-Site Inspection of Installed Fire Stops.

L. Inspection of fire-resistive joints and perimeter barriers shall be in accordance with ASTM E2393, Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.

1. Firestopping tests are performed by a qualified, testing and inspection agency. A qualified testing and inspection agency is UL or another agency performing testing and follow-up inspection services for perimeter fire containment systems acceptable to authorities having jurisdiction.

2. Perimeter fire containment system products bear classification marking of qualified testing and inspection agency.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver firestopping products to project site in original, unopened containers or packages with intact and legible manufacturer's labels identifying product and manufacturer, date of manufacture, lot number, UL or OPL classification marking, and mixing instructions for multi-component materials.

B. Store and handle materials per manufacturer's instructions to prevent deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

C. All firestop materials shall be installed prior to expiration of shelf life.

1.9 PROJECT CONDITIONS

A. Environmental Limitations - Install firestopping when ambient or substrate temperatures are within limits permitted by the manufacturer's written instructions. Do not install firestopping when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate per the manufacturer's written instructions on the product's Material Safety Data Sheet.

C. Verify the condition of the substrates before starting work.

D. Care should be taken to ensure that firestopping materials are installed so as not to contaminate adjacent surfaces.

1.10 SEQUENCING

A. Sequence Work to permit installation of materials in conjunction with other materials and seals.

1.11 COORDINATION

A. Contractor is to facilitate the exchange of Shop Drawings and other Submittals between Subcontractors so that Firestopping Contractor or Subcontractor has sufficient knowledge of the scope, penetrants, joint dimensions, and nature of fire resistance rated assemblies and other factors to be able to propose acceptable systems to meet the requirements of this Section.

B. Firestopping Contractor or Subcontractor is to communicate such information regarding the construction of openings, joints and penetrations as is required to enable compliant installation of the materials of this Section.

C. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

D. Do not conceal firestopping installations until the Owner's inspection agency or authorities having jurisdiction have examined each installation.

E. Schedule firestopping after installation of penetrants but prior to concealing the openings.

PART 2 PRODUCTS

2.1 FIRESTOPPING, GENERAL

A. Firestopping products specified in system design listings by UL or OPL may be used providing they conform to the construction type, penetrant type, annular space requirements and fire rating involved in each separate assembly.

B. Manufacturer of firestopping products shall have been successfully producing and supplying these products for a period of not less than three years and be able to show evidence of at least 10 projects where similar products have been installed and accepted.

C. Accessories - Provide components for each firestop system that are needed to install fill materials and to comply with Article 1.5. Use only components specified by the firestopping manufacturer and approved by UL or OPL for the firestop systems indicated. Accessories include, but are not limited to the following items:

1. Permanent forming/damming/backing materials, including the following:

    a. Mineral wool insulation.

    b. Foams or sealants used to prevent leakage of fill materials in liquid state.

    c. Fire-rated form board.

    d. Polyethylene/polyurethane backer rod.

    e. Rigid polystyrene board.

2. Temporary forming materials.

3. Substrate primers.

4. Steel sleeves.

D. All firestopping products and systems shall be designed and installed so that the basic sealing system will allow the full restoration of the fire resistance properties of the barrier being penetrated with minimal repair if penetrants are subsequently removed

2.2 MIXING

A. For those products requiring mixing before application, comply with firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

2.3 MANUFACTURERS

A. Subject to compliance with the requirements, provide products by one of the following:

1. Rectorseal, Houston, TX
2. Hilti, Inc., Tulsa, OK
3. Specified Technologies, Inc. (STI), Somerville, NJ, (800) 992-1180
4. 3M Fire Protection Products, St. Paul, MN, (800 328 1687
5. Thermafiber, LLC, Wabash, IN
6. Roxul, Inc., Milton, Ontario, CA
7. Owens Corning, Toledo, OH
8. Other manufacturers listed in the UL Fire Resistance Directory, Volume 2

2.4 MATERIALS

A. General - Use only firestopping products that have been tested for specific fire resistance rated construction conditions conforming to construction assembly type, penetrating item type, or joint opening width and movement capabilities, annular space requirements, and fire rating involved for each separate instance.

1. Specific manufacturers' products listed serve as a basis for design. Similar systems by named manufacturers that meet performance criteria of that section are also acceptable.

B. Intumescent Firestop Sealants and Caulk - Single-component latex formulations that, upon cure, do not re-emulsify during exposure to moisture.

1. FlameSafe FS1900 - RectorSeal Construction Products.

C. Elastomeric Water-Based Sealant - Single-component latex formulations that, upon cure, do not re-emulsify during exposure to moisture.

1. FlameSafe FS900+ - RectorSeal Construction Products.

D. Elastomeric Silicone Sealant (Single-Component) - Moisture curing, single-component, silicone elastomeric sealant for horizontal surfaces (pourable or non-sag) or vertical surfaces (non-sag).

1. FlameSafe Silicone - RectorSeal Construction Products.

E. Silicone Foam -Multi-component, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.

1. Pensil 200 Silicone Foam - Specified Technologies, Inc.

F. Firestop Putty and Pads

1. Putty -Intumescent, non-hardening, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

a. FlameSafe FSP1000 Putty - RectorSeal Construction Products.

2. Putty Pads -Intumescent, non-hardening pads or inserts for protection of electrical switch and receptacle boxes to reduce horizontal separation to less than 24 inches.

a. FlameSafe FSP1077 Putty Pads.

G. Firestop Devices -Factory assembled steel collars lined to fit specific outside diameter of penetrating item.

1. FlameSafe FSWSD Collar, FSIS Intumescent Sleeve, FlameSafe FSD Device - RectorSeal Construction Products.

H. Wrap Strips -Single-component intumescent strips faced on both sides with plastic film.

1. FlameSafe FSWS 100 Wrap Strip, FSWS 150 Wrap Strip - RectorSeal Construction Products.

I. Firestop Mortars -Portland cement-based dry mix product formulated for mixing with water at project site to form a non-shrinking, water-resistant, homogeneous mortar.

1. FlameSafe FSM Mortar - RectorSeal Construction Products.

J. Firestop Bags/Pillows - Re-enterable, non-curing, mineral fiber core encapsulated with an intumescent coating contained in a flame-retardant poly bag.

1. FlameSafe Bags, FlameSafe Pillows - RectorSeal Construction Products.

K. Elastomeric Coating - A water-based, spray-applied elastomeric coating for joints between fire-resistive assemblies and perimeter barriers that cures to a strong flexible seal, accommodating seismic, wind, and thermal contraction/expansion movement. Used with partially compressed mineral fiber backing.

1. FlameSafe FS3000 - RectorSeal Construction Products.

L. Fire-Rated Cable Pathway - Modular devices composed of steel raceway with intumescent foam pads permitting 0 to 100 percent cable fill.

1. EZ-Path™ Fire-Rated Pathway – STI.

M. Safing Insulation - Board or sheet products used as forming materials in slab edge openings with the capacity to provide a degree of the fire resistance required when used with an appropriate fill material.

1. Type SAF - Thermafiber, LLC.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance. Notify ENGINEER of any unsatisfactory conditions.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Verify that all pipes, conduits, cables, and/or other items, which penetrate fire-rated construction, have been permanently installed prior to installation of firestops.

3.2 PREPARATION

A. Surface Cleaning - Clean out openings immediately before installing firestop systems to comply with written recommendations of firestopping manufacturer and the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of firestop systems.

2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestop systems. Remove loose particles remaining from cleaning operation.

3. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, scale, laitance, rust, release agents, water repellents, and any other substances that may inhibit optimum adhesion.

4. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.

3.3 PENETRATION FIRESTOP SYSTEMS

A. General - Install through-penetration firestop systems to comply with Article 1.5 and firestopping manufacturer’s written installation instructions and published drawings for products and applications indicated.

B. Installation of firestopping shall be performed by an applicator/installer qualified as described in Article 1.7.

C. Apply firestopping in accordance with UL or OPL listed system designs or manufacturer’s EJ per the manufacturer’s installation instructions.

D. Install forming/damming/backing materials and other accessories required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire resistance ratings required.

E. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.

2. Apply materials so they fully contact and adhere to substrates formed by openings and penetrating items.

3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 JOINT FIRESTOP SYSTEMS

A. General - Install fire-resistive joint firestop systems to comply with required codes and ratings and with Article 1.5 and firestopping manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Installation of firestopping shall be performed by an applicator/installer qualified as described in Article 1.7.

C. Apply firestopping in accordance with UL or OPL listed system designs or manufacturer's EJ per the manufacturer's installation instructions.

D. Install joint forming/damming materials and other accessories required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths of installed firestopping material relative to joint widths that allow optimum movement capability and achieve fire resistance ratings required.

E. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill joint as required to achieve fire-resistance ratings indicated.

2. Apply materials so they fully contact and adhere to substrates forming the openings.

3. Completely fill recesses provided for each joint configuration.

4. Tool non-sag firestop materials after their application and prior to the time skinning begins. Use tooling agents approved by the firestopping manufacturer.

3.5 PERIMETER BARRIER FIRESTOP SYSTEMS

A. General - Install perimeter barrier firestop systems to comply with required codes and ratings and with Article 1.5 and firestopping manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Installation of firestopping shall be performed by an applicator/installer qualified as described in Article 1.7.

C. Apply firestopping in accordance with UL or OPL listed system designs or manufacturer's EJ per the manufacturer's installation instructions.

D. Install metal framing, curtain wall insulation, mechanical attachments, safing materials and firestop materials as applicable within the system design.

3.6 FIELD QUALITY CONTROL

A. Testing - The Owner will engage a qualified independent inspecting agency to inspect firestop systems, conduct material evaluation and application tests and prepare inspection reports. The Contractor shall cooperate fully and, when requested, permit samples of materials to be taken from original packaging as the materials are applied to building surfaces.

1. Inspection of completed installations of firestop systems shall take place in successive stages as installation of firestop systems proceeds. Do not proceed with installation of firestop systems for the next area until inspecting agency determines completed work shows compliance with requirements.

2. Inspection agency shall state in each report whether inspected firestop systems comply with or deviate from requirements.

B. Cost of Testing - If tests indicate that materials or work does not comply with requirements, the Contractor shall pay for tests performed, all retesting, and shall repair non-complying work. Where repair is not possible, the Contractor shall remove and replace the firestop materials.

C. Proceed with enclosing firestop systems with other construction only after inspection reports are issued and firestop systems comply with requirements.

3.7 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by firestopping manufacturer(s) and that do not damage materials in which openings occur. Leave finished work in neat, clean condition with no evidence of spillovers or damage to adjacent surfaces.

B. Provide final protection and maintain conditions during and after installation that ensure firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestop systems immediately and install new materials to produce firestop systems complying with specified requirements.

END OF SECTION

SECTION 07900

JOINT SEALERS

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. Furnish and install joint sealers and accessories in accordance with the Contract Documents including, but not limited to the following:

1. Sealants and caulking for non-submerged uses.

2. Backer rods and accessories.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-in-Place Concrete

B. Section 03451 - Architectural Precast Concrete

C. Section 04230 - Glass Unit Masonry

D. Section 04300 - Unit Masonry System

E. Section 05500 - Metal Fabrications

F. Section 07840 - Firestopping

G. Section 08110 - Steel Doors and Frames

H. Section 08331 - Overhead Coiling Doors

I. Section 15941 - Louvers and Dampers

J. Divisions 15 and 16: pipe, conduit, ducts, louvers and other items that penetrate wall or floor systems

1.3 REFERENCES

ASTM International Publications	
ASTM C834	Standard Specifications for Latex Sealants.
ASTM C919	Standard Practice for Use of Sealants in Acoustical Applications
ASTM C920	Standard Specification for Elastomeric Joint Sealants
ASTM C1330	Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants
Sealant, Waterproofing and Restoration Institute (SWR Institute)	
	Sealants: The Professional’s Guide

1.4 SUBMITTALS

A. Provide in accordance with Section 01300 (Submittals) and as supplemented herein. Submittals shall include, but not be limited to, the following:

1. Manufacturer’s Product Data – Manufacturer's literature describing performance characteristics validating product compliance with performance criteria specified and application procedures.

2. Samples – Submit samples illustrating manufacturer’s extended color range.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications - Company regularly engaged in manufacturing and marketing of products specified in this section.

B. Installer Qualifications - Qualified to perform work specified by reason of experience or training provided by product manufacturer.

C. Installation per manufacturer’s instructions and SWRI.

D. Perform acoustical sealant application work in accordance with ASTM C919.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in original factory packaging bearing identification of product, manufacturer, and batch number. Provide Material Safety Data Sheets for each product.

B. Store products in a location protected from freezing, damage, construction activity, precipitation, and direct sunlight in strict accordance with manufacturer's recommendations.

C. Condition products to approximately 60 to 70 degrees F for use in accordance with manufacturer's recommendations.

D. Handle all products with appropriate precautions and care as stated on Material Safety Data Sheet.

E. Do not use material that has exceeded manufacturer’s shelf life

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not use products under conditions of precipitation or freezing weather. Use appropriate measures for protection and supplementary heating to ensure proper curing conditions in accordance with manufacturer's recommendations if application during inclement weather occurs.

1.8 WARRANTY

A. Provide manufacturer's standard material warranty.

B. Include coverage for replacement of sealant materials, which fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

1.9 COORDINATION

A. Coordinate the work of this section with all sections referencing this section or referenced by this section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide all joint sealers of the same type from a single manufacturer.

B. Provide USDA and NSF approved sealants when indicated.

2.2 MATERIALS AND MANUFACTURERS

A. Multi-Component, Non-Sag Polyurethane Sealant - Sika “Sikaflex 2cNS,” BASF "MasterSeal NP 2," or equal with +50 percent movement capability for vertical joints; ASTM C920, Type M, Grade NS, Class 25. USDA approved; SWRI validated; UL classified (fire resistance).

B. Two Component, Self-Leveling Polyurethane Sealant - Sika “Sikaflex 2cSL,” BASF "MasterSeal SL 2," or equal with +25 percent movement capability for horizontal joints; ASTM C920, Type M, Grade P, Class 25; USDA approved.

C. Silicone Sealant - Sika “SikaSil C990 or 995,” ” Pecora “864,” or equal. ASTM C920, Type S, Grade NS, Class 25 or 50.

D. Single Component Siliconized Acrylic Latex Sealant – Bostik “Chem-Calk 600,” Pecora “AC 20+ Silicone,” or equal with +15 percent movement capability; ASTM C834.

E. Single Component Non-Sag Acrylic Latex Sealant - USG “Sheetrock Acoustical Sealant,” Pecora “AC20 FTR,” or equal. ASTM C834; SWRI validated; UL classified (fire resistance).

F. Single Component pre-pressurized expanding polyurethane foam sealant equal to Sika “Sika Boom.”

2.3 ACCESSORIES

A. Low VOC Primer - As recommended by manufacturer for particular sealant and substrate.

B. Joint Cleaner - Non-corrosive and non-staining type recommended by sealant manufacturer and compatible with joint forming materials.

C. Soft Backer Rod - Industrial Thermo Polymers Limited “104 Soft-Type Backer Rod,” Backer Rod Mfg. Inc. “Denver Foam” or equal; non-gassing, reticulated closed-cell polyethylene rod designed for use with cold-applied joint sealants.

1. Comply with ASTM C1330.

2. Size required for joint design.

D. Closed-Cell Backer Rod - Industrial Thermo Polymers Limited “101 Standard Backer Rod,” Deck-o-Seal “Kool-Rod” or equal closed-cell polyethylene rod designed for use with cold-applied joint sealants for on-grade or below-grade applications.

1. Comply with ASTM C1330.

2. Size required for joint design.

E. Joint Filler - Canzac “Expansion Joint Filler,” Sonneborn(R)/ChemRex "Expansion Joint Filler," or equal closed-cell polyethylene joint filler designed for use in cold joints, construction joints, or isolation joints wider than 1/4 inch (6 mm).

1. Size required for joint design.

F. Bond Breaker - Pressure-sensitive tape recommended by sealant manufacturer to suit application.

2.4 COLOR

A. Sealant Colors – From manufacturer’s extended range of colors. Match to adjacent materials as directed by the Schedule of Joint Sealers at the end of this section.

PART 3 EXECUTION

3.1 EXAMINATION

A. Inspect all areas involved in work to establish extent of work, access, and need for protection of surrounding construction.

1. Verify that substrate surfaces and joint openings are ready to receive work.

2. Verify that joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

A. Remove loose materials and foreign matter, which impair adhesion of joint filler.

B. Clean joints and saw cuts by grinding, sandblasting, or wire brushing to expose a sound surface free of contamination and laitance. Prime joints.

C. Ensure structurally sound surfaces, dry, clean, free of dirt, moisture, loose particles, oil, grease, asphalt, tar, paint, wax, rust, waterproofing, curing and parting compounds, membrane materials, and other foreign matter.

D. Where the possibility of joint filler staining of adjacent areas or materials exists, mask joints prior to application.

1. Do not remove masking tape before joints have been tooled and initial cure of joint filler has taken place.

2. Work stained due to failure of proper masking precautions will not be accepted.

3.3 INSTALLATION

A. Back-Up Material

1. Install appropriate size backer rod, larger than joint where necessary according to manufacturer's recommendations.

2. Install polyethylene joint filler in joints wider than 1/4 inch (6 mm) to back-up material per manufacturer's recommendations.

3. Do not install epoxy joint filler over backer rod

B. Bond Breaker - Install bond-breaker strip in joint to be sealed on top of back-up material to prevent adhesion of sealant to back-up material. Install per manufacturer's recommendations.

C. Sealant

1. Prepare sealants that require mixing. Follow manufacturer's recommended procedures, mixing thoroughly.

2. Mix only as much material as can be applied within manufacturer's recommended application time period.

3. Apply materials in accordance with manufacturer's recommendations. Take care to produce beads of proper width and depth, tool as recommended by manufacturer, and immediately remove surplus sealant.

4. Apply materials only within manufacturer's specified application life period. Discard sealant after application life is expired or if prescribed application period has elapsed.

D. Expansion Joint Systems - Install per manufacturer’s instruction for the system as shown on Drawings and as required by substrates and conditions encountered.

3.4 CLEANING

A. Remove uncured sealant and joint filler with sealant manufacturer’s recommended solvent. Remove cured sealant and joint filler by razor, scraping, or mechanically.

B. Remove all debris related to application of sealants from job site in accordance with all applicable regulations for hazardous waste disposal.

3.5 SCHEDULE OF JOINT SEALANTS

SEALANT TYPE	LOCATIONS FOR APPLICATION	COLOR	COMMENTS
Two-component, non-sag polyurethane (UL classified)	Metal door, window, or louver frames at masonry openings or metal siding openings	Match frame color	Prime frame as recommended by sealant manufacturer for particular factory finish
Two-component, non-sag polyurethane (UL classified)	Expansion joints in veneer masonry or joints between architectural precast concrete panels	Match warm limestone color of original mortar used for face brick of existing building	Sealant installed of a color that has not been approved and is not a good match will be removed and replaced at Contractor's expense
Two-component, self-leveling polyurethane sealant	Control, movement, or perimeter joints in horizontal concrete	Match finished concrete color	
Silicone sealant	Glass at metal	Clear	
Single-component acrylic latex	Intersections of non-structural interior finish materials	White	Paint to match adjacent material

END OF SECTION

SECTION 08110

STEEL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section defines the minimum requirements to complete the fabrication of steel doors. This Work shall include, but not be limited to, the following:

1. Steel doors and frames.
2. All door anchors and trim.
3. Factory applied finish.
4. Stanley Security System.

1.2 RELATED SECTIONS

A. Section 08710 - Finish Hardware

B. Section 02831 – Chain Link Fencing

1.3 REFERENCES

A. Allowable tolerances shall be in accordance with ANSI/SDI-100-91.

1.4 QUALITY ASSURANCE

A. Manufacturer shall have no less than five (5) years experience in the manufacture of steel doors.

B. Installation of doors shall be done by experienced door installers.

C. Door manufacturer shall be a member of the Steel Door Institute.

1.5 SUBMITTALS

A. Shop Drawings and manufacturer's literature:

1. Submit for approval Shop Drawings showing door and installation details, including anchorage, fastening and sealing methods.
2. Dimensioned elevations showing door opening and frame sizes.
3. The manufacturer shall not commence any work until Shop Drawings have been approved.
4. Color charts for standard finishes and sealants.

1.6 GUARANTEE

A. Guarantee all materials and workmanship furnished to be free from defects for a period of 12 months from the date of final acceptance or from date of substantial occupancy, whichever may be earlier. Repair or replace, at manufacturer's option and expense, any materials or workmanship found to be defective under conditions of normal use during this period.

PART 2 MATERIALS

2.1 DOOR AND FRAME

A. Door and frame construction shall be in accordance with ANSI/SDI A250.8-2003. The following options shall be provided:

Description	Grade III, Model 1
Minimum Door Metal Thickness	16 GA or 0.053
Door Faces	Full flush
Basic Door Type	No glass
Door Thickness	1-3/4 inch
Core Design	Polystyrene
Frame	14 Ga. welded type
Opening Size	(Field verify to determine rough opening and verify nominal door sizes, as scheduled herein)

B. Doors shall be insulated exterior type.

2.2 FACTORY PAINTING

A. After fabrication, doors and frames shall be painted with one coat of rust inhibitive primer compatible in accordance with ANSI A224.1 and with specified field painting system

2.3 DESIGN CLEARANCES

A. Door design clearances shall be as follows:

Between door and frame head and jambs	1/8-inch
At bottom of door	3/4-inch
Between face of door and door stop	1/16-inch
Clearance tolerance	±1/32-inch

B. The CONTRACTOR shall ensure that the steel door and specified facility door contacts and security system can work as one system with no modifications. If the two units require fabrication, it will be at no expense to the OWNER.

2.4 DOOR SCHEDULE

A. For existing doors and frames being replaced, any existing signage shall be replaced with new signage displaying the same symbols and/or wording as before. The color of existing doors being replaced shall match existing. Coordinate with the OWNER to determine standard color scheme.

B. The CONTRACTOR shall field verify existing conditions prior to ordering the doors, frames, and appurtenances.

C. Refer to Contract Drawings for Door Schedules

D. For replacement doors, any existing signage shall be replaced with new signage displaying the same symbols and/or wording as before.

E. For new door installation, exact wording, layout, color scheme, and sign type shall be reviewed with OWNER for approval prior to posting.

2.5 STANLEY SECURITY SYSTEM

A. Security System shall be provided by Stanley Security to ensure compatibility with OWNERS existing facilities security systems. CONTRACTOR shall coordinate directly with Stanley Security to ensure that all installed security systems, hardware, and software is compatible.

B. Security equipment shall be supplied on all exterior doors (existing and new pump station buildings) and also at the new motorized site security gate. See Section 02831 Chain Link Fencing for Security Gate details.

C. Man Entry Door Security:

1. Manufacturer: Card reader manufacturer shall be by HID Global, MiniProx or approved equal.

2. Furnish and install secure card reader entry on all building exterior doors (typical of 7).

3. Card readers shall be mounted directly adjacent to exterior doors.

4. Card reader shall be designed for indoor/outdoor use and sealed in a weatherized enclosure and withstand an operating environment of -30 degrees C (-22 degrees F) to 65 degrees C (150 degrees F) with 0-95 percent relative humidity.

D. Site Slide Gate Security:

1. Manufacturer: Security Gate Card reader manufacturer shall be by HID Global, ProxPro with Keypad or approved equal.

2. Furnish and install secure card reader and keypad entry device and exit device at site motorized slide gate.

3. Card reader with keypad shall be installed on a pedestal as shown on the contract drawings.

4. Card reader shall be designed for indoor/outdoor use and sealed in a weatherized enclosure and withstand an operating environment of -30 degrees C (-22 degrees F) to 65 degrees C (150 degrees F) with 0-95 percent relative humidity.

E. Security Reader Interface

1. Manufacturer: Lenel LNL-1320 Series 3, or approved equal.

2. Furnish and install security reader interface to connect all card readers to security system controller.

3. Power: 12 to 24Vdc ± 10%, 550 mA maximum.

4. Output: 6 outputs, Form-C contacts: Normally Open (NO) Contact: 5A @ 30 Vdc, Normally Closed (NC) Contact: 3A @ 30 Vdc.

5. Input: 8 unsupervised/supervised, standard EOL: 1k/1k ohm, 1% 1/4 watt 2 unsupervised, dedicated for cabinet tamper and UPS fault monitoring.

6. Reader interface: Reader power: 12Vdc ±10% regulated, 300mA maximum each reader (jumper selectable and input voltage (VIN) must be 20Vdc minimum) or 12 to 24Vdc ±10% (input voltage passed through) 300mA maximum each reader.

7. Reader Port Compatibility: Wiegand Data 1/Data 0, Magnetic Clock/Data, Supervised and Unsupervised F2F, Open Supervised Device Protocol.

8. Operating Temperature: 0 degrees C (32 degrees F) to 70 degrees C (158 degrees F) with 5-95 percent relative humidity.

F. Security System Controller

1. Manufacturer: Lenel LNL-X2220, or approved equal.

2. Furnish and install security system controller to connect security reader interface to Stanley Security Server.

3. Primary Power: 12 to 24 VDC ± 10%, 500 mA maximum (reader current not included).

4. Reader Ports: 600 mA maximum (add 600 mA to primary power current).

5. Primary Host Communication: Ethernet: 10-BaseT/100Base-TX.

6. Secondary Host Communication: USB port (2.0) with optional adapter: pluggable model USB2-OTGE100.

7. Serial I/O Device: One each: 2-wire RS-485, 2,400 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit.

8. Inputs: Eight unsupervised / supervised, standard EOL: 1k/1k ohm, 1% 1/4 watt; two unsupervised inputs dedicated for cabinet tamper and UPS fault monitoring.

9. Outputs: Four relays: Normally open contact (NO): 5 A @ 30 VDC resistive; Normally closed contact (NC): 3 A @ 30 VDC resistive.

10. Reader Interface

    a. Power: 12 VDC ± 10% regulated, 300 mA maximum each reader (input voltage [VIN] must be greater than 20 VDC) or 12 to 24 VDC ± 10% (input voltage passed through), 300 mA maximum each reader.

    b. Data Inputs: TTL compatible, F/2F or 2-wire RS-485.

    c. RS-485 Mode: 9,600 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit. Maximum cable length: 2,000 ft. (609.6m).

    d. LED Output: TTL levels, high > 3 V, low < 0.5 V, 5 mA source/sink maximum.

    e. Buzzer Output: Open collector, 12 VDC open circuit maximum, 40 mA sink maximum.

11. Cable Requirements

    a. Power and relays: One twisted pair, 18 to 16 AWG.

    b. Ethernet: CAT-6 minimum.

    c. TTL Reader: 22 to 16 AWG.

d. Alarm Input: One twisted pair, 30 ohms maximum, typically 22 AWG @ 1,000 ft. (304.8m).

e. RS-485 I/O Device Port: One twisted pair with drain wire and shield, 120 ohm impedance, 24 AWG, 4,000 ft. (1,219m) maximum.

f. RS-485 Reader Port: One twisted pair with drain wire and shield, 120 ohm impedance, 24 AWG, 2,000 ft. (610m) maximum.

g. Composite Cable, Paige Part# 2S31952R5 for cable from New Access Enclosure on wall (30" x 30" x 6") to each Access reader.

h. Bus Cable, Paige Part # 744005 if ECWA wants to put a LNL-1320-S3 board with power supply out at new gate in NEMA 4. If not, then composite cable.

12. Operating Temperature: 0 degrees C (32 degrees F) to 70 degrees C (158 degrees F) with 5-95 percent relative humidity.

PART 3 EXECUTION

3.1 INSPECTION

A. Door openings shall conform to details, dimensions and tolerances shown on the door manufacturers approved Shop Drawings.

B. Conditions, which may adversely affect the door installation, must be corrected before installation commences.

3.2 INSTALLATION

A. Doors specified under this section shall be installed by experienced personnel.

B. Install doors in openings in strict accordance with approved Shop Drawings.

1. Set units plumb, level and true to line without warp or rack of frames.

2. Anchor units securely to surrounding construction with approved fasteners.

C. Attach door hardware as required and adjust to operate smoothly and free from twist.

D. Repair any abraded areas of the factory finish.

E. Security System Installation shall be coordinated by CONTRACTOR directly with Stanley Security.

3.3 CLEANING

A. Door installer shall leave door surfaces clean after installation. Touch up any flaws or scratches due to handling or installation prior to final inspection.

END OF SECTION

SECTION 08331

OVERHEAD COILING DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Insulated galvanized steel slat overhead coiling doors, electric operation.

1. Coil, hood, and guide mounted to the interior side of the building exterior wall.

1.2 RELATED SECTIONS

A. Section 04300 - Unit Masonry System

B. Section 05500 - Metal Fabrications

C. Section 16010 - Electrical Conditions

1.3 REFERENCES

Door & Access Systems Manufacturers Association International (DASMA)	
ANSI/DASMA 108	Standard Method For Testing Sectional Garage Doors And Rolling Doors: Determination Of Structural Performance Under Uniform Static Air Pressure Difference
ASTM International (ASTM)	
ASTM B221	Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A229	Standard Specification for Steel Wire, Quenched and Tempered for Mechanical Springs
ASTM A653	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A666	Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
ASTM E330	Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
National Electrical Manufacturers Association (NEMA)	
NEMA ICS 6	Industrial Control and Systems: Enclosures
NEMA 250	Enclosures for Electrical Systems (1000 Volts Maximum)
NEMA MG 1	Motors and Generators
Underwriters Laboratories, Inc. (UL)	
UL 325-02	ANSI/CAN/UL Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems – with Revisions through June 2013

1.4 DESIGN REQUIREMENTS

A. Design door assembly to withstand dead loads, and live loads acting normal to plane of the door curtain of 20 pounds per square foot, positive and negative.

B. Provide door assemblies with an air leakage rate (as tested per ANSI/DASMA 105, NFRC 400, or ASTM E283 at 1.57 psf) of no more than 1.00 CFM/FT^2.

C. Provide doors with operating components, including springs and motors, rated to operate 20 cycles a day and for no less than 50,000 cycles for the life of the component

D. Conform to the electrical requirements shown in the table in Article 3.6 of this section.

1.5 SUBMITTALS

A. Shop Drawings - Show all information required to coordinate door installation and demonstrate conformance to the Drawings and specifications, including, but not limited to:

1. Slat material, profile, and finish.

2. Air infiltration rating.

3. Positive and negative wind force resistance.

4. Guide materials and dimensions. Call out fastener material, size and location.

5. Hood materials, finishes, and configuration.

6. Rough opening dimensions.

7. Configuration details and characteristics of all electrical components, including voltage, phase, intrinsic safety, and NEMA ratings.

    a. Motorized Operator

    b. Horsepower.

    c. Operating speed.

    d. Monitoring, status and display functions.

8. Electrical wiring diagram, showing wiring from unit components to junction box.

B. Product Data

1. Descriptions, illustrations, and relevant performance characteristics of all system components.

2. Manufacturer’s statement verifying that operating components, including springs and motors, have been tested and are rated to operate 20 cycles a day and for no less than 50,000 cycles for the life of the component.

3. Manufacturer’s original color selection document. Scanned, photographed, or products of ink jet or laser printers are not acceptable.

C. Maintenance Data - Indicate lubrication requirements and frequency, periodic adjustments required, and general care information.

1.6 REGULATORY REQUIREMENTS

A. Electrical Components - UL listed.

1.7 COORDINATION

A. Coordinate the work with installation of electric power, locations and size of conduit, and alarms.

B. Coordinate the mounting of motors to avoid conflicts with the configuration of framing and walls at each individual building opening.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Overhead Door Corporation, Lewisville, TX.

B. Cornell Iron Works, Mountaintop, PA.

C. Or equal.

2.2 BASIS OF DESIGN PRODUCTS

A. Insulated Slat Galvanized Steel Overhead Coiling Doors

1. Thermiser Max by Cornell Iron Works.

2. Model 626 by Overhead Door Corporation.

3. Or equal.

2.3 MATERIALS AND FINISHES

A. Insulated Door Curtain Slats

1. Galvanized steel per ASTM A653.

a. Slat profile and gauge as required to meet design loads referenced in paragraph 1.04.A. of this section.

Minimum Curtain Metal Thickness - 18 gauge.

b. Exterior Slat Finish - Manufacturer’s premium polyester powder coat system:

1) Overhead Door Corporation PowderGuard Premium

2) Cornell Iron Works SpectraShield

3) Or equal

4) Color to be selected by Engineer from a range of no less than 160 colors. Color selection to be approved by Owner.

c. Interior Slat Finish - Manufacturer's standard gray polyester finish: powder coat system:

1) Overhead Door Corporation Standard Exterior Color

2) Cornell Iron Works GalvaNex

3) Or equal

B. Hoods – Match material and interior finish of door curtain slats.

C. Guides and Mounting Brackets – 300 series stainless steel.

D. Fasteners – Stainless steel of dimension and spacing suitable for supporting adjacent construction and capable of providing required support.

E. Weather Seals – As required to meet air infiltration requirements.

2.4 REQUIREMENTS FOR ELECTRICAL COMPONENTS

A. Provide electrical components of the appropriate NEMA category for the electrical hazard and environmental conditions shown by the table in 3.6 of this Section.

B. Power supplied for motor operators will be 120 VAC, 1 phase.

C. Size motor for each opening for reliable operation of doors of specific curtain size and material at that opening. Design to withstand 20 cycles per day and a total lifetime usage of no less than 50,000 cycles.

2.5 DOOR OPERATION

A. Electrically Operated Doors

1. Electric Motor Operators:

a. Geared, lubricated drive reduction.

b. Pre-wired for UL 325 compliant monitored entrapment protection devices.

c. Auxiliary chain hoist interlock.

d. Radio control receiver incorporated.

e. LED display with status indicators and cycle counter.

f. Mounting options including top of coil and front of coil.

g. Basis of Design Products

1) RHX by Overhead Door Company.

2) Model SG by Cornell Iron Works.

3) Or equal.

2. Provide interior control stations where shown on Drawings.

a. Interior control stations are to be surface-mounted, three-button devices with Open, Close, and Stop functions.

3. Provide manual pull chain operation at the building interior with the ability to override the motor lock in case of power failure or electrical motor malfunction.

4. Provide sensing edge or photoelectric device to halt operation of door when an obstruction is detected.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that opening sizes, tolerances, and conditions are acceptable.

3.2 INSTALLATION

A. Install door unit assembly in accordance with manufacturer's instructions.

B. Securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation and interconnection of electrical power and control with Electrical Trade. Provide enclosed reversing starter for hazardous area locations.

F. Install slat enclosure and drive assembly enclosure.

G. Install perimeter trim, closures, and weatherstripping.

3.3 ERECTION TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Maximum Variation From Plumb - 1/16-inch.

C. Maximum Variation From Level - 1/16-inch.

D. Longitudinal or Diagonal Warp - $\pm$1/8-inch per 10-foot straight edge.

3.4 TESTING AND ADJUSTING

A. Test all motorized and manual operations of doors.

B. Adjust door, hardware, and operating assemblies.

3.5 CLEANING

A. Clean door and components.

B. Remove labels and visible markings.

3.6 OVERHEAD DOOR ELECTRICAL HAZARD AND ENVIRONMENTAL INFORMATION TABLE.

Door No.	**Room Electrical Hazard Classification**	**Required NEMA Category**
Gen Set PS-101		
PS101B	Dry Location	NEMA 12 or NEMA 1
Garage PS-102		
PS102B	Dry Location	NEMA 12 or NEMA 1
Electrical PS-103		
PS103B	Dry Location	NEMA 12 or NEMA 1
Fuel Tank Room PS-106		
PS106B	Class 1, Div 2 Hazard	NEMA 7 or NEMA 9

END OF SECTION

SECTION 08710

FINISH HARDWARE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section defines the minimum requirements for the supply and installation of finish hardware.

1. The types of finish hardware required shall include, but are not limited to, the following:

a. Mortise hinges.

b. Latchsets.

c. Panic exit devices.

d. Door closers.

e. Thresholds.

f. Stripping and seals.

g. Kick plate.

1.2 RELATED SECTIONS

A. Section 08110 – Steel Doors and Frames

1.3 REFERENCES

A. Comply with the applicable provisions and recommendations of the following except where otherwise shown or specified.

1. FS TT-S-001657, Sealing Compound -- Single Component, Butyl Rubber Based, Solvent Release Type.

2. National Fire Protection Association, Standard for Fire Doors and Windows No. 80.

3. UL, Building Materials Directory.

4. UL, List of Inspected Fire Protection Equipment and Materials.

5. UL, Hardware, Automatic Flush or Surface Bolts.

6. National Builders Hardware Association, Recommended Locations for Builders Hardware.

1.4 QUALITY ASSURANCE

A. Supplier Qualifications: The finish hardware supplier shall have in his employ a member of the American Society of Architectural Hardware Consultants who shall be responsible for the complete finish hardware Contract.

B. Design Criteria:

1. Where the finish, shape, size or function of a member receiving finish hardware is such as to prevent the use of, or make unsuitable the types specified, furnish similar types having as nearly as practicable the same operation.

2. If finish hardware for any location is not specified, provide finish hardware equal in design and quality to adjacent finish hardware for comparable openings.

3. Furnish finish hardware items of proper design for use on doors and frame of the thickness, profile, swing, security and similar requirements, as necessary for proper installation and function.

4. Unless otherwise specified, comply with the National Builders Hardware Association, "Recommended Locations for Builders Hardware."

C. Requirements of Regulatory Agencies:

1. Provide finish hardware for fire-rated openings in compliance with NFPA No. 80. This requirement takes precedence over other requirements for finish hardware.

2. Provide only finish hardware, which has been tested, listed and labeled by UL for the types and sizes of doors required, and complies with the requirements of the door and doorframe labels. Modify scheduled finish hardware, as required, to meet UL requirements.

3. Codes: Comply with the applicable requirements of governing authorities and codes for the types of finish hardware specified.

D. Source Quality Control: To the greatest extent possible, obtain each type of finish hardware from only one manufacturer.

E. All hardware shall conform to New York State Building Code accessibility requirements.

1.5 JOB CONDITIONS

A. Scheduling: Deliver individually packaged finish hardware items at the proper time to the proper locations for installation.

1.6 SUBSTITUTIONS

A. Do not make substitutions after ENGINEER'S approval of final finish hardware schedule.

PART 2 PRODUCTS

2.1 MATERIALS AND FABRICATION

A. General

1. Hand of Door: The Contract Drawings show the swing or hand of each door leaf (left, right, reverse bevel, etc.). Furnish each item of finish hardware for proper installation and operation of the door swing as shown.

2. Manufacturer's Name Plate: Do not use manufacturer's products, which have manufacturer's name or trade name displayed in a visible location (omit removable nameplates), except in conjunction with required UL labels.

3. Base Metals: Produce finish hardware units of the basic metal and forming method specified, using the manufacturer's standard metal alloy, composition, temper and hardness. Do not substitute materials or forming methods for those specified.

4. Fasteners: Manufacture finish hardware to conform to published templates, generally prepared for machine screw installation. Do not provide finish hardware, which has been prepared for self-tapping sheet metal screws, except as specifically indicated.

5. Furnish screws for installation, with each finish hardware item. Provide Phillips flat-head screws except as otherwise specified. Finish exposed (exposed under any condition) screws to match the hardware finish or, if exposed in surfaces on other work, to match the finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.

6. Provide fasteners which are compatible with both the unit fastened and the substrate, and which will not cause corrosion or deterioration of finish hardware, base material or fastener.

7. Tools for Maintenance: Furnish a complete set of specialized tools as needed for OWNER'S continued adjustment, maintenance, removal and replacement of finish hardware.

8. The CONTRACTOR shall ensure that the door hardware and specified facility door contacts and security system can work as one system with no modifications. If the two units require fabrication, it will be at no expense to the OWNER.

B. Full Mortise Hinges

1. Templates and Screws: Provide only template-produced units.

2. Base Metal: Except as otherwise specified, fabricate hinges from stainless steel and finish to match the latch and lock, etc.

3. Number of Hinges: Except as otherwise specified, provide two hinges on each door leaf of less than 60-inches height, and provide one additional hinge for each 30-inch, or fraction thereof, of height in excess of 60 inches.

4. Hinge Size: Except as otherwise specified or as required to comply with UL and NFPA, provide hinges of the following sizes:

   a. Average use, 4-1/2-inch standard weight (0.134").

5. Middle hinge for active access control door shall be a 6-wire electric hinge, mounted as middle hinge from door to frame, Model ST-CECB179-66-626 by Stanley Security Solutions.

C. Panic Exit Devices

1. Product and Manufacturer:

   a. Stanley Security Solutions, Precision Electronic Latch retraction Surface-Mount Vertical Rods Panic Exit Device, Model PR-ELR-2203-1703A-630-LHRB.

   b. First Choice Building Products, EL3000 Series Exit Devices with Electric Latch Retraction.

2. Provide panic exit devices for each access control door in accordance with ANSI A156.4-2008 and UL listed for panic and fire, installed per manufacturer's recommendations.

3. Strikes: Provide manufacturer's standard wrought box strike, stainless steel, finish to match panic exit device trim and complying with UL List of Inspected Fire Protection Equipment and Materials and NFPA No. 80 requirements.

4. Lock Throws: Provide minimum of 3/4-inch latch bolt throw.

5. Inactive leaf door shall be supplied with top and bottom flush bolts.

6. Finish: Satin Stainless Steel.

7. Operation

   a. Inside Slight pressure on crossbar to retract bolt. Bolt lockable to maintain retraction and fix crossbar position.

   b. Outside: Lockable thumb piece.

8. Power Supply: Precision panic device power supply by Stanley Security Solutions, Model PR-ELR-151.

D. Cylinders and Keying System

1. Cylinders shall be Model 1E72-RP-626 Rim Cylinder with core by Best Access; Yale 1210 Interchangeable Core (IC) Cylinder, or approved equal.

2. Review the keying system with the OWNER and provide the type required (master, grandmaster or great-grandmaster), whether new or integrated with OWNER'S existing system at each door.

3. Key Material: Provide keys of nickel silver only.

4. Key Quantity: Furnish 3 keys for each lock and 5 keys for each master and grandmaster system. Provide one extra key blank for each lock.

E. Door Closers

1. Product and Manufacturer:

   a. LCN Closers, 4000 Series.

   b. Sentinel.

   c. Or approved equal.

2. Provide door closer for each door of double door combination, of the non-handed, non-sized type in accordance with ANSI A156.4 Grade 1 and UL listed.

3. Closers shall be capable of being mounted on head of frame.

4. Closers shall have spring power adjustment.

5. Adjustable, hydraulic back check capable of cushioning opening swing prior to 90 degrees shall be provided.

6. Finish shall match satin stainless steel.

F. Threshold

1. Product and Manufacturer:

a. Pemko Manufacturing Company.

b. Sealeze.

c. Or approved equal.

2. Threshold shall be panic type constructed of aluminum with a neoprene insert.

G. Stripping and Seals

1. Product and Manufacturer:

a. Pemko Manufacturing Company.

b. Schlage Door Hardware.

c. Or approved equal.

2. Provide polyurethane jamb and head stripping.

3. Provide a door sweep at the bottom of each door.

H. Kick Plate

1. Provide a kick plate on the interior of the door with finish to be satin stainless steel.

2.2 HARDWARE FINISHES

A. Provide machine finishes for finish hardware units at each door or opening, to the greatest extent possible. Reduce differences in color and textures as much as commercially possible where the base metal or metal forming process is different for individual units of finish hardware exposed at the same door or opening. In general, match all items to the manufacturer's standard finish for the latch and lock set for color and texture.

PART 3 EXECUTION

3.1 INSPECTION

A. CONTRACTOR and his installer shall examine the substrate to receive finish hardware, and ascertain the conditions under which the Work will be performed, and notify the ENGINEER in writing of unsatisfactory conditions. Do not proceed with the finish hardware work until unsatisfactory conditions have been corrected in a manner acceptable to the ENGINEER.

3.2 PREPARATION

A. Templates: Furnish finish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of finish hardware. Upon request, check the Shop Drawings of such other work, to confirm that adequate provisions are made for the proper installation of the finish hardware.

3.3 INSTALLATION

A. Mount finish hardware units at heights recommended in "Recommended Locations for Builders' Hardware" by National Builders Hardware Association except as otherwise specified or required to comply with governing regulations.

B. Install each finish hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install finish hardware onto or into surfaces, which are later to be painted or finished in another way, install each item completely and then remove and store in a secure place during the finish application. After completion of the finishes, re-install each item. Do not install surface-mounted items until finishes have been completed on the substrate.

C. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

3.4 ADJUSTMENT AND CLEANING

A. Adjust and check each operating item of finish hardware and each door, to ensure proper operation or function of every unit. Lubricate moving parts with the type lubrication recommended by manufacturer (graphite-type if no other recommended). Replace units that cannot be adjusted and lubricated to operate freely and smoothly as intended for the application.

B. Final Adjustment: Where finish hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the Work during the week prior to acceptance or occupancy, and make a final check and adjustment of all finish hardware items in such space or area. Clean and re-lubricate operating items as necessary to restore proper function and finish of finish hardware and doors. Adjust door control devices to compensate for final operating of heating and ventilating equipment.

C. Instruct OWNER'S personnel in proper adjustment and maintenance of finish hardware during the final adjustment of finish hardware.

D. Finish hardware that is blemished or defective will be rejected even though it was set in place before defects were discovered. Remove and replace with new finish hardware. Repair all resultant damage to other work.

E. Continued Maintenance Service: Approximately 6 months after the acceptance of finish hardware in each area, the CONTRACTOR, accompanied by the representative of the latch and lock manufacturer, shall return to the Project and re-adjust every item of hardware to restore proper function of doors and finish hardware. Consult with and instruct OWNER'S personnel in recommended additions to the maintenance procedures. Clean and lubricate operational items wherever required. Replace finish hardware items, which have deteriorated or failed due to faulty design, materials or installation of finish hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the finish hardware.

END OF SECTION

SECTION 09900

PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section includes the surface preparation, coating, and painting system requirements including, but not be limited to, the following:

1. Coating and painting of piping

2. Coating and painting of structures and miscellaneous metal fabrication including, but not limited to:

a. Piping

b. Steel support structures

c. Pipe supports

d. Interior walls and ceilings

e. Concrete where specified

f. As directed by the ENGINEER

1.2 RELATED SECTIONS

A. Section 01010 – Summary of Work

1.3 REFERENCES

A. Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified.

1. Steel Structures Painting Council.

2. ASTM Standards.

3. ANSI A13.1, Scheme for the Identification of Piping Systems.

4. OSHA 1910.144, Safety Color-Code for Marking Physical Hazards.

5. Great Lakes - Upper Mississippi River Board of State and Provincial Public Health and Environmental Mangers (Ten States Standards), Recommended Standards for Water Works, Latest Edition.

6. National Sanitation Foundation (NSF), Standard 61.

7. Occupational Safety and Health Administration (OSHA) 1910.144, Safety Color-Code for Marking Physical Hazard.

8. The Society for Protective Coatings (SSPC) Volume 2, Systems and Specifications, Surface Preparation Guide and Paint Application Specifications.

9. American Society for Testing and Materials (ASTM) D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.

10. American Water Works Association (AWWA) C204 - Chlorinated Rubber-Alkyd Paint Systems for the Exterior of Above Ground Steel Water Piping and D102 - Painting Steel Water Storage Tanks.

11. Requirements of Regulatory Agencies: Coatings for surfaces in contact with potable water or water being treated for potable use shall not impart any taste or odor to the water or result in any organic or inorganic content in excess of the maximum contaminant level established by applicable laws or regulations. Painting systems shall be certified for potable water contact as per NSF Standard 61.

12. 6 NYCRR Chapter III – Air Resources Part 205 – Architectural and Industrial Maintenance Coatings

1.4 DEFINITIONS

A. The term "paint" as used herein means all coating systems materials, which includes pretreatments, primers, emulsions, enamels, stain, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

B. The term "exposed" as used herein shall mean all surfaces not covered with concrete, plaster, fireproofing, or similar material.

1.5 QUALITY ASSURANCE

A. All paint products shall be supplied by the same manufacturer unless otherwise approved.

B. Applicator Qualifications

1. Submit the name and experience record of the painting applicator. Qualified applicators shall be considered as those with not less than five (5) years' experience using the products and procedures specified herein. Include a list of utility or industrial installations painted, responsible officials, architects, or ENGINEERS concerned with the Project and the approximate contract price.

2. Painting applicators whose submissions indicate that they have not had the experience required to perform the Work will not be approved.

C. Protection

1. Cover or otherwise protect finished Work of other trades and surfaces not being painted concurrently or not to be painted.

2. The OWNER's existing system processes and utilities shall remain in operation at all times during this Work. Employ procedures to prevent contamination of the process, or cause system shutdown due to the work of this section. Submit proposals for protection work to ENGINEER for review.

3. Do not begin painting work in any area until ENGINEER approves protection techniques proposed by CONTRACTOR.

4. Provide fire extinguishers and spot caution signs warning against smoking and open flame when working with flammable materials.

D. Environmental Requirements

1. Apply coatings only when the temperature of surfaces to be coated and the surrounding air temperatures are within the range specified by the coating manufacturers.

2. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds the manufacturer's recommendations; or to damp or wet surfaces.

3. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods.

4. Provide illumination and ventilation in all areas where painting operations are in progress.

5. Install piping markers and safety signs only after all painting and finish work has been completed.

1.6 SUBMITTALS

A. Submit under provisions of these specifications.

B. Samples: Submit for approval, the following:

1. Submit two (2) samples, 6-inch by 6-inch minimum in size illustrating the selected colors and textures for each finishing coat.

C. Shop Drawings - Submit for approval the following:

1. Copies of manufacturer's technical information, including label analysis and application instructions for each material proposed for use.

2. Copies of CONTRACTOR's proposed protection procedure in each area of the Work.

3. List each material and cross-reference to the specific paint and finish system and application. Identify by manufacturer's catalog number and general classification.

4. Copies of manufacturer's complete color charts for each coating system.

5. Maintenance Manual - Upon completion of the Work, furnish copies of a detailed maintenance manual including the following information.

a. Product name and number.

b. Name, address and telephone number of manufacturer and local distributor.

c. Detailed procedures for routine maintenance and cleaning.

d. Detailed procedures for light repairs such as dents, scratches and staining.

e. All other submittals as referred to in this Section.

6. Submit proposed application techniques to ENGINEER. Submit proof of acceptability, of technique proposed, by the paint manufacturer selected.

7. Submit a list of application methods proposed, listing paint systems and locations.

1.7 PROJECT CONDITIONS

A. In locations where flammable vapors may be present, take positive action to prevent ignition by eliminating and controlling sources of ignition.

1. Sources of ignition may include, but are not limited to: open flames, lightning, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical and mechanical), spontaneous ignition, chemical and physical-chemical reactions, and radiant heat.

B. Provide mechanical ventilation adequate to remove flammable vapors to a safe location and to confine and control combustible residues so that life or property is not endangered.

1. Equipment used to control hazardous exposure shall be explosion-proof.

2. Keep mechanical ventilation in operation at all times while coating or painting operations are being conducted and for a sufficient time thereafter to allow flammable vapors from drying coatings or paints to be exhausted. Ventilation shall reduce the concentration of air contaminant to the degree a hazard does not exist. The exhaust discharge point of fumes shall be not less than 10 feet from any combustible exterior wall or roof nor shall the discharge be in the direction of any combustible construction or unprotected opening in any non-combustible exterior wall within 50 feet.

C. Provide adequate illumination while Work is in progress, including explosion-proof lights and electrical equipment.

1. Whenever required by the ENGINEER, provide additional illumination and necessary supports to cover all areas to be inspected.

2. The level of illumination for inspection purposes shall be determined by the ENGINEER.

D. Inside buildings, provide tight-fitting temporary partitions as required to protect mechanical and other equipment from abrasive blasting particles and to contain the spread of paint fumes.

E. Comply fully with the manufacturer's recommendations as to environmental conditions under which the coating and coating systems can be applied.

1.8 SAFETY AND HEALTH REQUIREMENTS

A. Provide and require use of personnel protective equipment for persons working in or about the Project Site, all in accordance with requirements set forth by regulatory agencies applicable to the construction industry, the paint manufacturer's printed instructions, and appropriate technical bulletins and manuals.

1.9 SPECIAL DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to Site under provisions of the Special Conditions.

B. Deliver products to the Site in sealed and labeled containers; inspect to verify acceptability. The delivery packages shall be original, new, and unopened.

C. Container label shall include the name of the manufacturer, type of paint, brand name, lot number and date of manufacture, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

D. Store paint materials at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by the instructions of the manufacturer.

E. Store only acceptable Project materials on Project Site.

F. Store in a suitable clean, dry, and accessible location.

G. Comply with health and fire regulations including the Occupational Safety and Health Act (OSHA) of 1970.

H. Handle products carefully to prevent inclusion of foreign materials.

I. Do not open containers or mix components until necessary preparatory Work has been completed and application Work will commence immediately.

1.10 PAINTING NOT INCLUDED IN THE WORK OF THIS SECTION

A. The following categories of Work are not included as part of the field-applied finish Work, or are included in other sections of this Specification or in other Contracts.

1. Shop Priming: Unless otherwise specified, shop priming of field-finished items such as structural metal, miscellaneous metal fabrications, and other fabricated components such as shop-fabricated or factory-built heating and ventilating, and electrical equipment or accessories shall conform to applicable requirements of this Section.

B. Pre-Finished Items:

1. Items furnished with factory finishes such as baked-on enamel, porcelain, polyvinylidene fluoride, or other similar finish.

2. Touch up factory finished items with paint supplied by the item manufacturer. CONTRACTOR shall field paint damaged pre-finished items as directed by ENGINEER.

C. Concealed Surfaces:

1. Nonmetallic wall or ceiling surfaces concealed from view areas and generally inaccessible areas, such as furred areas, pipe spaces, duct shafts and elevator shafts, as applicable to this Project.

2. Paint all piping, equipment, and other such items within these areas that do not have a galvanized or other corrosion resistant finish as specified.

3. Concrete covered with cementitious coatings.

4. Concrete floors covered with tile, seamless flooring, concrete topping or similar products.

5. Plastic and fiberglass surfaces unless otherwise specified.

6. Finished Metal Surfaces: includes anodized aluminum, stainless steel, copper and chromium plate unless otherwise indicated.

7. Structural steel, reinforcing steel, anchors, and miscellaneous metals encased in concrete.

PART 2 PRODUCTS

2.1 PAINT MANUFACTURERS

A. Tnemec Company, Inc.

B. Sherwin-Williams.

C. Or approved equal.

2.2 GENERAL

A. Provide finish coats that are compatible with the priming paints used. Review other Sections of these Specifications in which priming paints are to be provided to ensure compatibility of the total coatings systems for the various substrates. CONTRACTOR shall be responsible for the compatibility of all shop primed and field painted items in this Contract. Furnish information on the characteristics of the finish materials proposed to use, to ensure that compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify the ENGINEER in writing of anticipated problems using the coating systems as specified with substrates primed by others.

B. Color of finish coat shall be as indicated or if not indicated, as selected by the OWNER.

C. No substitutions shall be considered which decrease the film thickness, the number of coats, the surface preparation or the generic type of coating specified. Approved manufacturers must furnish the same color selection as the manufacturers specified, including accent and custom colors in all coating systems.

D. Colors and Finishes

1. Surface treatments and finishes are shown under "Coating Systems" below. All substrates scheduled under "Coating Systems" shall be painted whether or not indicated on the Contract Drawings, or in schedules, unless an item is specified as not requiring the painting system scheduled below.

2. Color Coding - In general, all color coding of piping, pumps, and equipment shall comply with Ten State Standards Section 2.14.

3. Use representative colors when preparing samples for the review of the ENGINEER.

4. Color Pigments - Pure, non-fading, applicable types to suit the substrates and service indicated.

2.3 COATING SYSTEMS

A. Carbon Steel (structural steel, miscellaneous metal, tanks, piping and equipment).

1. Interior Steel, Non-Immersion:

Applications include new structural steel, pumps, valves, piping, and equipment. Existing interior steel without coating or with coating system significantly damaged

a. Surface Preparation - SSPC SP6 or SSPC SP11

b. Prime Coat – Tnemec Series 394 PerimePrime;
Sherwin Williams Corothane I Mio-Aluminum

- Dry Film Thickness - 2.5 to 3.5 mils.

c. Intermediate Coat – Tnemec Series V69 Hi-Build Epoxoline II;
Sherwin Williams Macropoxy 646 FC

- Dry Film Thickness - 3.0 to 5.0 mils.

d. Finish Coat – Tnemec Series V69 Hi-Build Epoxoline II;
Sherwin Williams Macropoxy 646 FC

- Dry Film Thickness - 3.0 to 5.0 mils.

2. Interior Steel, Non-Immersion: Applications include existing steel pipe with existing coating system significantly intact.

a. Surface Preparation - SSPC SP1 and SSPC SP2

b. Prime Coat – Spot and Full Prime Coat – Tnemec Series 394 PerimePrime;
Sherwin Williams Corothane I Mio-Aluminum

- Dry Film Thickness – 2.5 to 3.5 mils.

c. Finish Coat – Tnemec Series V69 Hi-Build Epoxoline II;
Sherwin Williams Macropoxy 646 FC

- Dry Film Thickness - 3.0 to 5.0 mils.

B. Indoor Wall and Ceiling Surfaces

1. Cement Plaster and Gypsum Wallboard

a. Surface Preparation - Clean, dry, and free of loose material.

b. Prime Coat – Tnemec Series 151-1051 Elasto-Grip;
Sherwin Williams Loxon Conditioner

- Dry Film Thickness – 2.0 to 3.0 mils.

c. Finish Coat – Tnemec Series 1029 Enduratone
Sherwin Williams SherCryl SG (Semi-Gloss)

- Dry Film Thickness - 2.0 to 3.0 mils.

C. Masonry Wall Surfaces

1. Interior Exposed Masonry

a. Surface Preparation - Clean, dry, and free of loose material.

b. First Coat – Tnemec Series 130 Envirofill
Sherwin Williams Cement-Plex 875

- Dry Film Thickness – 80 to 100 sq. ft. per gal.

c. Intermediate Coat – Tnemec Series V69 Hi-Build Epoxoline II
Sherwin Williams Macropoxy 646 FC

- Dry Film Thickness - 3.0 to 4.0 mils.

c. Finish Coat – Tnemec Series 287 Enviro-Glaze
Sherwin Williams Armorseal 8100

- Dry Film Thickness - 2.0 to 3.0 mils.

D. Copper Piping

1. Interior Exposed Piping

a. Surface Preparation - Scarify with emery cloth to achieve bright shiny copper.

b. First and Second Coats – Tnemec Series V69 Hi-Build Epoxoline
Sherwin Williams Macropoxy 646 FC

- Dry Film Thickness - 2.0 to 3.0 mils. per coat

E. PVC Piping

1. Interior Exposed Piping

a. Surface Preparation - Clean, degrease, and lightly abrade with sandpaper.

b. First and Second Coats – Tnemec Series V69 Hi-Build Epoxoline II.
Sherwin Williams Macropoxy 646 FC

- Dry Film Thickness – 2.0 – 3.0 mils. per coat

PART 3 EXECUTION

3.1 GENERAL

A. Piping to be Insulated

1. Exposed piping where existing insulation has been removed and replaced shall not require a full coating system underneath new insulation.

2. Piping to be insulated requires surface preparation and primer coating.

B. Operating Parts and Labels

1. Moving parts of operating units, mechanical and electrical parts, such as valve operators, and motor shafts do not require finish painting, unless otherwise specified.

2. Do not paint over any code-required labels, such as UL and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

3. Remove all paint, coating or splatter inadvertently placed on these surfaces.

4. Touch up factory finished items with paint supplied by the item manufacturer. CONTRACTOR shall field paint damaged pre-finished items as directed by ENGINEER.

3.2 EXAMINATION

A. CONTRACTOR and his applicator shall examine the areas and conditions under which painting work is to be performed and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

C. Provide services of Manufacturers Representative to inspect surfaces after cleaning. Manufacturers Representative shall certify that surfaces are properly clean and dry and are ready for intended paint application.

3.3 PREPARATION

A. Surfaces

1. Perform all preparation and cleaning procedures as specified herein and in strict accordance with the paint manufacturer's instructions for each particular substrate and atmospheric condition.

2. Remove all hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish painted, or provide surface applied protection prior to surface preparation and painting operations. Remove, if necessary, for the complete painting of the items and adjacent surfaces. Following completion of painting of each space or area, reinstall the removed items by workmen skilled in the trades involved.

B. Materials

1. Mix and prepare painting materials in strict accordance with the manufacturer's directions.

2. Do not mix together coating materials produced by different manufacturers, unless otherwise permitted by the manufacturer's instructions.

3. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in a clean condition, free of foreign materials and residue.

4. Stir all materials before application to produce a mixture of uniform density, and as required during the application of the materials as defined by the manufacturer.

3.4 APPLICATION

A. General

1. Apply paint by brush, roller, air spray or airless spray in accordance with the manufacturer's written recommendations and directions and recommendations of Paint Application Specifications No. 1 in SSPC Vol. 2, where applicable. Use brushes best suited for the type of material being applied. Use rollers of carpet, velvet back, or high pile sheep's wool as recommended by the paint manufacturer for material and texture required. Use air spray or airless spray equipment recommended by the paint manufacturer for specific coating system specified.

2. The number of coats and paint film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has completely dried.

3. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. This is of particular importance regarding intense primary accent colors. Insure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a film thickness equivalent to that of flat surfaces.

4. The application shall leave no sags, runs or holidays. Any damage in any coat shall be repaired to conform to this specification prior to final inspection.

5. Where required, imperfections and holes in surfaces to be coated shall be cleaned and repaired in a manner approved by the ENGINEER.

6. Each coat shall be applied in a different color or shade from the preceding coat to aid in determining the uniformity and coverage of the coating.

7. No coating shall be applied unless the surface is at the manufacturers recommended temperature relative to the dew point temperature. This requirement also applies during curing of the coatings.

B. Minimum Coating Thickness

1. Apply each material at not less than the manufacturer's recommended spreading rate, and provide total dry film thickness as specified.

2. Apply extra coats if required to obtain specified total dry film thickness.

C. Scheduling Painting

1. Apply the first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

2. Allow sufficient time between successive coatings to permit proper drying in accordance with manufacturers recommendations. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

D. Prime Coats

1. Recoat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects caused by insufficient sealing.

E. Brush Application

1. Brush-out and work all brush coats onto the surfaces in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable. Neatly draw all glass and color break lines.

F. Mechanical Applicators

1. Use mechanical methods for paint application when permitted by governing ordinances, paint manufacturer, and approved by ENGINEER. If permitted, limit to only those surfaces impracticable for brush applications.

3.5 FIELD QUALITY CONTROL

A. CONTRACTOR shall provide all equipment necessary to maintain the proper humidity level in the Work area in accordance with manufacturers' representatives. CONTRACTOR shall submit to ENGINEER a plan to properly address any and all humidity problems prior to the start of Work in accordance with Manufacturer's recommendations. Plan shall be for ENGINEER's information and not submitted for approval.

B. After completion of each coat of paint, CONTRACTOR shall notify ENGINEER. After inspection, checking of film thickness and approval by ENGINEER, proceed with the succeeding coat. CONTRACTOR shall supply a Gardner dry-film thickness gage and check the film thickness in the presence and at locations directed by the ENGINEER. Additional coats shall be applied, if required, to produce the specified film thickness.

C. Protection

1. Protect work of other trades, whether to be painted or not, against damage by the painting and finishing work. Leave all such work undamaged. Correct all damages by cleaning, repairing or replacing, and repainting, as acceptable to the ENGINEER.

2. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove all temporary protective wrappings provided for protection after completion of painting operations.

3.6 CLEANING

A. During the progress of the Work, remove from the Site all discarded paint materials, rubbish, cans and rags at the end of each workday.

B. Upon completion of painting work, clean window glass and all other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

C. At the completion of work of other trades, touchup and restore all damaged or defaced painted surfaces as determined by ENGINEER.

END OF SECTION

SECTION 10441

PLASTIC AND FIBERGLASS SIGNS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Signs.

1.2 RELATED SECTIONS

A. Section 08710 - FINISH HARDWARE

1.3 REGULATORY REQUIREMENTS

A. Conform to Americans with Disabilities Act (ADA) requirements as they pertain to areas of access for visually-impaired persons.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in accordance with Section 01640.

B. Store and protect products in accordance with Section 01660.

C. Package signs, labeled in name groups.

D. Store adhesive tape at ambient room temperatures.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Do not install signs when ambient temperature is below 70 degrees F. Maintain this minimum during and after installation of signs.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Best Manufacturing - Products: HC300E MP or Fiberglass Company for company room designations and Type “MP” for safety/equipment signs.

2.2 SIGNAGE REQUIREMENTS

A. Interior Room Designation Signs - Laminated colored plastic; in black face color. Size to be 10-inch x 3-inch of 1/8-inch thick material. Room names shall be 5/8-inch high standard bold condensed upper case raised white letters. Standard 3/8-inch border and 1/2-inch radius corners; mounted with vinyl foam tape.

B. Exterior Location/Designation Signs - Laminated colored fiberglass; in black face color. Size to be 10-inch x 3-inch, of 1/8-inch thick material. Room names shall be 5/8-inch high standard bold condensed upper case raised white letters. Standard 3/8-inch border and 1/2-inch radius corners; mounted with silicone backing cement and stainless steel one-way screws and expansion shields.

C. Danger and safety signs shall be laminated colored plastic; in red face color. Size shall be proportional to message of 1/8-inch thick material. Danger and Safety signs shall have 1-inch high upper case raised white letters. No border or radius corners required.

D. Provide copy of all text on all engraved plastic and fiberglass signs in 1/32-inch Braille dots for visually-impaired persons.

E. Attach all handrail mounted signs with stainless steel U-bolts.

F. Attach all safety and equipment signs with stainless steel mounting hardware.

G. Attach all exterior door signs with silicone backing cement and stainless steel one-way screws and expansion shields.

H. Attach interior door signs with adhesive vinyl foam tape. Tape Adhesive - Double sided tape with permanent adhesive; 1/16-inch vinyl foam for wall or door mounting. Do not install adhesive signs when ambient temperature is below 70 degrees F.

I. Material requirements for other signs shall be as noted in the schedules below.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Beginning of installation means installer accepts existing surfaces.

3.2 INSTALLATION

A. Install in accordance with manufacturer’s instructions.

B. Install signs after doors and surfaces are finished.

C. Mount signs to walls. Coordinate location with OWNER.

D. Clean and polish.

3.3 BUILDING AND ROOM SIGN SCHEDULES

A. Room Designation Signs - Provide sign with room name on doorway or entrance to each room of each building. Room names are shown on the Drawings.

3.4 DANGER AND SAFETY SIGN SCHEDULES

A. Provide red “EXIT” signs above inside face of all exterior doors in new or rehabilitated buildings, not provided with lighted signs.

B. Fire Extinguisher – Provide identifying sign at each unit.

END OF SECTION

SECTION 10522

FIRE EXTINGUISHERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fire extinguishers.

1.2 RELATED SECTIONS

A. Section 01310 - PROJECT COORDINATION

B. Section 04300 - UNIT MASONRY SYSTEMS

1.3 REFERENCES

A. NFPA 10 - Portable Fire Extinguishers.

B. UL 299 - Dry Chemical Fire Extinguishers.

C. UL 711 - Rating and Testing of Fire Extinguishers.

1.4 SUBMITTALS FOR REVIEW

A. Section 01331: Procedures for submittals.

B. Shop Drawings - Indicate cabinet physical dimensions, wall bracket mounted measurements, and location.

C. Product Data - Provide extinguisher operational features, color and finish, and anchorage details.

D. Manufacturer's Installation Instructions - Indicate special criteria and wall coordination requirements.

E. Maintenance Data - Include test, refill or recharge schedules and re certification requirements.

1.5 QUALITY ASSURANCE

A. Provide units conforming with UL 711 and UL 299.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable codes and NFPA 10 for requirements for extinguishers.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Larsen’s Manufacturing Company - Model MP10.

B. JL Industries Incorporated - Model Cosmic 10E.

C. Substitutions - Under provisions of Section 01630.

2.2 EXTINGUISHERS

A. Dry Chemical Type - UL 299, heavy duty steel tank with pressure gage; Classes A, B, and C fires, size 10 lbs.

B. Extinguisher Finish - Epoxy enamel, red color.

2.3 ` ACCESSORIES

A. Extinguisher Brackets - Manufacturer’s standard formed steel, Larsen’s B-2 or equal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01310 - Verification of existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install brackets plumb and level; secure rigidly in place 4 feet 4 inches from finished floor to top of fire extinguisher operating handle.

C. Fasten brackets into masonry construction with adhesive anchors.

D. Provide fire extinguisher adjacent to exterior personnel door. Maintain at least 6-inch clearance between edge of door and any part of extinguisher or bracket.

E. Mount fire extinguishers at the locations as directed by OWNER/ENGINEER.

END OF SECTION

SECTION 11304

HORIZONTAL SPLIT CASE PUMPS

PART 1 GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, supervision, and equipment necessary to furnish, install, and commission horizontal split case centrifugal pumps with direct mounted motor as specified herein.

2. All new pumps shall be supplied complete with a new drive motor, pump/ motor subbase frame pump/motor flexible gear coupling, coupling guards, connection bolts, foundation anchor bolts, hardware, and associated accessories.

3. The pump and motor units shall be suitable for continuous operation at full nameplate load.

4. All materials specified herein shall be provided by a single pump manufacturer.

B. General:

1. The Contract Drawings do not necessarily show all components required to accomplish the desired results or all components required to interface equipment. All parts, equipment, wiring and devices required to meet the functional requirements shall be provided.

2. The Contract Documents are intended to show a general arrangement of equipment, connecting piping and valves, all of the approximate sizes, shapes and locations required unless otherwise specified or shown. The Contract Drawings are not intended to show exact dimensions of pumps, connected piping and concrete foundation. These may have to be changed in order to accommodate the units furnished.

1.2 RELATED SECTIONS

A. Section 01100 – Summary of Work

B. Section 01311 – Coordination with Owner’s Operations

C. Section 01620 – Equipment - General

D. Section 01640 – Transportation and Handling of Materials

E. Section 01751 – Starting and Placing Equipment in Operation

F. Section 01780 – Record Documents

G. Section 01781 – Operation and Maintenance Data

H. Section 09900 – Painting

I. Section 16480 – Variable-Frequency Drives

1.3 QUALITY ASSURANCE

A. To ensure that all the equipment required is properly coordinated and will function in accordance with the intent of these Specifications, the CONTRACTOR shall obtain all the equipment specified under the various subdivisions of this Section from the pump manufacturer in whom the responsibility for the proper function of all the equipment as an integrated and coordinated unit shall be vested. The intent of this paragraph is to establish unit responsibility for all the pump and motor equipment with the pump manufacturer. The use of the word "responsibility" relating to the pump manufacturer is in no way intended to relieve the CONTRACTOR's ultimate responsibility under this Contract for equipment coordination, operation and guarantee.

B. The manufacturer shall be a business regularly engaged in the manufacture, assembly, construction, start-up and maintenance of pumping equipment of the type required for this Project. The manufacturer shall have a minimum of 10 years of continuous experience in providing stations of the type, design, function and quality as required for this Project. The manufacturer shall be able to demonstrate experience, through the detailed design, fabrication, and commissioning, of a minimum of 10 similar sized units in the previous 5 years. The manufacturer shall be certified in accordance with the requirements of ISO 9001 and shall provide written proof of certification.

C. The pumps shall be new and in proper working order. In no case will secondhand or damaged equipment be acceptable. Both workmanship and material shall be industrial quality and shall be entirely suitable for the service conditions specified.

D. Requirements of Regulatory Agencies: Comply with applicable provisions of regulatory agencies below and others having jurisdiction.

1. Underwriter’s Laboratories, Incorporated.

2. Local and State Electrical Codes and Ordinances.

3. Local and State Building Codes and Ordinances.

E. Pump Factory Shop Tests.

1. A minimum of one (1) shop performance test shall be performed on each pump. The OWNER and/or ENGINEER shall be permitted to witness all performance tests and re-tests at the OWNER's option. Each pump assembly shall be performance tested in accordance with the latest Hydraulic Institute (HI) standards for horizontal centrifugal pumps and to ensure compliance with the stated requirements of this specification.

2. Pump Casings shall be hydrostatically tested to twice the design head and one-and-a-half times the shutoff head for the current operating conditions. Design and shutoff heads are specified in Paragraph 2.2 of this Section.

3. Performance Test: The pump assembly shall be operated from zero to maximum capacity as shown on the initial standard pump curve included in the approved Shop Drawing. Results of the certified shop test shall be shown in a plot of test curves showing head, flow, brake horsepower, pump efficiency, and current. Readings shall be taken at a minimum of six (6) evenly spaced capacity points including shutoff, design point 1, design point 2 and minimum head at which the pump is designed to operate.

4. The pumps shall each be assembled and tested using the actual supplied motors for the project and with variable frequency drives that are available at the pump manufacturer's facility. The actual wire-to-water efficiency of the pump shall be computed and compared to the guaranteed wire-to-water efficiency stated in the approved Shop Drawing.

5. If the shop performance test indicates that the pump does not conform to specified and/or guaranteed performance, the unit shall be modified and re-tested at no additional cost to the OWNER until full compliance with the specified and guaranteed performance is demonstrated.

6. For the shop performance tests, the pump shall be run for at least 30 minutes at the rated condition before any readings are obtained.

7. There shall be no minus tolerance with respect to capacity, total head, and pump efficiency at the design point condition and at the specified secondary conditions. Pump performances shall be within the following tolerances:

   a. At specified head conditions: plus 10 percent of specified capacity.

   b. At specified capacity conditions: plus 5 percent of specified head conditions.

8. Pump efficiency shall be based on normal wearing ring clearances and not on minimum clearances obtained only during initial operation.

9. Each pump shop performance test shall be witnessed by a Licensed Professional Engineer, who may be an employee of the manufacturer. He/she shall sign and seal all copies of curves and shall certify that shop performance tests were performed. Five original copies of the pump performance curves shall be submitted to the ENGINEER for approval prior to the pumps leaving the manufacturing facility.

10. Pumps shall not be shipped until the ENGINEER has approved the test reports.

1.4 REFERENCES

A. Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. Standards of the Hydraulic Institute.

2. National Electrical Code.

3. Standards of the National Electrical Manufacturer's Association.

4. Institute of Electrical and Electronic Engineers.

5. American National Standards Institute.

6. Standards of American Society for Testing and Materials

7. Standards of the American Water Works Association

8. Recommended Standards for Water Works

9. Industrial Society of America (ISA).

10. Standards of the National Fire Protection Agency (NFPA).

11. Standards of Underwriter's Laboratories, Inc.

1.5 SUBMITTALS

A. Submittals shall be in accordance with Section 01331.

B. The CONTRACTOR shall submit for approval the following literature and shop drawings.

1. Descriptive literature for the pumps showing size, general arrangements, standard pump curve, materials of construction for all components, dimensions, weight of the complete pump/motor assembly and of pump and motor alone, and other important details including but not limited to; standard pump performance curves showing; head-capacity relationship, brake horsepower, NPSH, overall pump efficiency, pump speed, best operating point, preferred operating range, and allowable operating range. The curves shall be complete for the entire range of operation from shutoff to minimum head conditions.

2. Descriptive literature for the motors showing general arrangement, materials of construction, insulation, dimensions, pump foundation modifications (if needed), and other important details including, but not limited to; Motor horsepower, Motor efficiency, Motor full load current, Motor locked rotor current.

3. Descriptive documents for all electrical components at the station showing general arrangement, materials of construction, dimensions, schematic and wiring diagrams, equipment nameplate data and the like.

4. Mechanical seal water piping and accessory schematics and specifications.

5. Pump/motor frame anchor bolt layout and anchor bolt loads that will be transmitted into the pump concrete foundations.

6. Factory Certified pump performance curves of the actual pumps being supplied, showing head - capacity relationship, brake horsepower, NPSH, overall pump efficiency, pump speed, best operating point, preferred operating range, and allowable operating range. The curves shall be complete for the entire range of operation from shutoff to minimum head conditions.

7. Field alignment and report shall be performed by third party furnished by CONTRACTOR including but not limited to the following pump to motor alignment data:

   a. Angular alignment.

   b. Axial or parallel alignment.

   c. Proper coupling gap.

   d. Anchor bolt loadings.

8. Complete installation drawings and data including; setting drawings, which indicate the materials, used, location, pump foundation modifications (if needed), arrangements and size for all anchor bolts required for the pump and motor unit, pump and motor support stand, installation, fabrication details, and other devices and accessories forming a part of the equipment furnished. Generic or Standard cut sheets or drawings will not be acceptable

9. Pump manufacturer's representative shall review the conditions of installation including pump locations and arrangements and approve such prior to submittal.

10. Startup testing instructions and the final startup report.

11. Startup vibration testing report.

12. Operation and Maintenance Manuals including complete installation, operation and maintenance data with copies of all approved Shop Drawings. Information provided shall include, but not be limited to the following:

    a. Complete, detailed written operating instructions for each product or piece of equipment including: equipment function; operating characteristics; limiting conditions; operating instructions for startup, normal and emergency conditions; regulation and control; and shutdown.

    b. Recommended spare parts list and local sources of supply for parts.

    c. Written explanations of all safety considerations relating to operation and maintenance procedures.

    d. Name, address and phone number of manufacturer, manufacturer's local service representative.

    e. Preventive maintenance instructions including, but are not limited to, the following:

        1) A written explanation with illustrations for each preventive maintenance task.

        2) Recommended schedule for execution of preventive maintenance tasks.

        3) Lubrication charts.

        4) Table of alternative lubricants.

        5) Trouble-shooting instructions.

        6) List of required maintenance tools and equipment.

13. Guarantee of performance and parts per Part 1.6 below.

14. Submit performance affidavit for all equipment furnished under this section in accordance with Sections 01331 and 01620.

1.6 WARRANTY & GUARANTEE

A. The pump warranty shall be for a period of 2 years from the date of final acceptance by OWNER and placement into continuous permanent operation.

In addition to the guarantee, CONTRACTOR shall include the services of a factory-trained serviceperson to provide preventative maintenance service for the equipment for the period of two (2) years commencing after the equipment is placed in continuous permanent operation.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Handle all system equipment with care. Equipment that is cracked, chipped, dented, or otherwise damaged or dropped shall not be acceptable. All paint chip, nicks, and blemishes shall be repaired to satisfaction of OWNER/ENGINEER. Protect all threads, seats, ends, etc., from damage and corrosion.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Provide a complete and workable horizontal pump system as supplied by:

1. ITT Gould.

2. Flowserve Corporation.

3. Patterson Pump Company.

B. The Contract Documents depict equipment and materials manufactured by ITT Gould. CONTRACTOR shall be responsible for making all resulting changes to the design to accommodate other manufacturers.

C. In the event the CONTRACTOR obtains ENGINEER's acceptance for equipment substitution, the CONTRACTOR shall, at his own expense, make all resulting changes to the process design, as required to accommodate the proposed equipment. Revised detail drawings illustrating the substituted equipment shall be submitted to the ENGINEER for review. CONTRACTOR shall be responsible for any and all required structural, mechanical, process, and electrical modifications that result from an equipment substitution.

2.2 SERVICE CONDITIONS

A. Performance Requirements - The CONTRACTOR shall supply four (4) new horizontal split case pump units, as indicated on the Contract Drawings. The performance requirement of each pump is indicated in the table below.

Pumping Unit Design Requirements	
Item	**Value**
No. of Pump Units	4
Type of Operation on VFD	Speed Varies on Discharge Pressure Setpoint
Design Point 1 Flow at Full Speed	16,000 gpm
Design Point 1 TDH at Full Speed	120 ft
Minimum Pump Efficiency @ Design Pt 1	83%
Design Point 2 Flow at Full Speed	9,000 gpm
Design point 2 TDH at Full Speed	165 ft
Maximum Shut-Off Head	197 ft
Maximum NPSHr @ Design Pt 1	32.5 ft
Maximum NPSHr @ Design Pt 2	25 ft
Maximum Motor Speed	1190 rpm
Typical Maximum Disch Pressure Setpoint	70 psi (with multiple pumps operating)
Typical Minimum Disch Pressure Setpoint	35 psi
Typical Minimum Operating Speed	75% of Full
Typical Minimum Flow at Min Speed	10,000 gpm
Suction Connection Size	18 inches
Discharge Connection Size	20 inches
Liquid Pumped	Potable Water
Liquid Temperature Range	32°F to 80°F

1. The pumps shall be suitable for any operation along its performance curve.

2. The station discharge pressure and flow will be obtained with either 1, 2, or 3 pumps operating in parallel.

3. The basis of design is an ITT Gould 18 x 20-24 Model 3420 horizontal split case pump with a six (6) vane, 20.625-inch diameter impeller, operating at 1190 RPM. The variable speed drives will be programed to control the speed of the pumps to meet the pressure setpoint conditions.

4. The motor shall operate on 480V, 3-phase power and have a rated maximum speed of 1200 RPM and a rated maximum power of 600 HP. Motors shall be controlled via variable frequency drives as specified under Section 16480.

5. In order to ensure proper operation under all conditions, pump must provide, without overheating in continuous operation, the maximum head condition required by the system.

6. Maximum vibration velocity in inches per second RMS, measured in the field, shall conform to the requirements of ANSI/HI 9.6.4.

7. The complete pumping units provided under this section shall be supplied by one manufacturer.

8. Manufacturer is responsible for furnishing and installing the pump seal water system and connection to existing drains. Seal water system shall include but not limited to; mechanical seal, regulator valves, isolation valves, and associated piping and other accessories.

9. Each pumping unit shall be provided with a stainless steel nameplate, which shall contain the following information:

    a. Manufacturer's name, address, and telephone number

    b. Model number

    c. Serial number

    d. Head, capacity and rpm at rated condition

    e. Motor horsepower, rpm and frame size

10. Pumping units shall be identical in every respect with all parts being interchangeable.

11. Pump rotating assemblies shall be balanced in accordance with the requirements of ANSI S2.19, G6.3.

12. Vibration shall not exceed the limitations specified by the Hydraulic Institute Standards.

B. Details of Pump Construction:

1. Materials of construction shall be in conformance with applicable ANSI standards. The following materials or equivalent alternates for the service conditions, as determined by the ENGINEER, shall be provided:

PART NAME	MATERIAL	ASTM#/UNS#
Casing	Cast Iron	A48, CL40
Casing Cover	Cast Iron	A48, CL40
Impeller	Nickel Aluminum Bronze	NSF
Shaft	Carbon Steel	1045
PART NAME	**MATERIAL**	**ASTM#/UNS#**
Wear Rings	Nickel Aluminum Bronze	B148
Shaft Sleeve	316 Stainless Steel	A743, CF-8
Bearings	Ball Bearing	N/A
Mechanical Seal	John Crane	N/A
Bearing Bracket	Carbon Steel	A36
Bearing Housing	Cast Iron	A48, CL 30
Bearing Cover	Cast Iron	A48, CL 30
Pump and Motor Subbase Frame	Carbon Steel	A36

2. Pump Casing

   a. The casing shall be of close grain cast iron type ASTM A48, class 40, designed for heavy-duty service. The casing shall be horizontally split; volute type with the suction and discharge flanges cast integrally with the lower half in order that the upper part may be removed for inspection of the rotating element without disturbing pipe connections or pump alignment. Pump mounting feet are to be cast integrally into the lower half casing. The joint between halves of the casing shall be heavily flanged and bolted, and provided with dowel pins to ensure accurate alignment. The upper half-casing flanged shall have tapped holes for jackscrews. The interior shall be smooth and free from surface defects.

   b. Casings shall be drilled and tapped for vertical priming, gauges, and drain connections. Suitable lifting lugs or eyebolts shall be provided.

   c. The upper half of the casing shall have taps for seal piping, priming, and vents. The pump shall also be provided with a manual valve, nipple, and automatic air relief valve to bleed entrapped air.

   d. Suction and discharge connections shall be ASA 125-pound flat face flanges. Each suction and discharge flange shall be drilled and tapped for gauge connections.

3. Impeller

   a. The impeller shall be of the enclosed double suction type made of Nickel Aluminum Bronze (NSF Certified) and of ample strength and stiffness for maintaining the maximum capacity of the unit. Impeller shall be mounted on the shaft with a key and a contoured lock nut. It shall be statically and dynamically balanced according to an ISO/ANSI G6.3 quality level to minimize vibration.

4. Wearing Rings

   a. At the running joint between the suction and discharge chambers, there shall be provided wear rings on both the casing and impeller.

   b. The casing rings shall be of ASTM B505-C95200 bronze, positioned in the casing and locked against rotation by the upper half of the case.

   c. Impeller rings shall be of ASTM B505-C95400 bronze, so fastened that they cannot rotate or become loose when the pump is subjected to reversed rotation. The rings shall be made to limit gauges, so that they may be renewed without fitting.

5. Shaft

   a. The pump shaft shall be high-strength carbon steel, SAE #1045 minimum, accurately machined over its entire length and of sufficient size to transmit full driver output and of such dimensions that the maximum combined stress due to bending and torsion shall not exceed 8,000 pounds per square inch under the most severe conditions of operation. It shall be protected from the pumped liquid by a shaft sleeve in the stuffing box area. A seal shall be provided, by a synthetic rubber "O" ring, between the shaft and shaft sleeve to prevent leakage of pumped liquid out and/or air into the pump. The shaft shall be threaded for an impeller nut.

   b. The shaft shall be accurately machined over its entire length. The first critical speed of the rotating assembly shall occur at not less than 150% of the rated speed.

   c. Threads on the pump shaft shall be located outside of the stuffing box.

6. Shaft Sleeve

   a. A renewable shaft sleeve, which extends completely under the mechanical seal shall be provided. Shaft sleeves shall be of 400 series stainless steel with a hardness of at least 450 Brinnell.

7. Bearings

   a. Bearings shall be anti-friction, grease-lubricated type. Sealed for life bearings are not acceptable. The bearings shall be adequately sized for long life without the addition of external cooling. The inboard bearing shall be designed to take the radial thrust loads. The outboard bearings shall be designed to take a combination of loads, both radial and axial; and hold the rotor in axial alignment.

   b. Bearings shall have a minimum rated service life of 100,000 hours in accordance with the standards of the Bearings Manufacturers Association throughout the specified operating range. Bearings shall be mounted in removable dust tight housings shall be rigidly supported by suitable brackets, which shall bolted and doweled to the lower half of the pump casing.

8. Bearing Frame

   a. Pump bearing frame shall be one-piece rigid cast iron or fabricated steel construction. Frame shall be provided with a cast iron or steel bearing housing at the outboard end and an end cover at the inboard end. Both ends of the frame shall be provided with lip grease seals and labyrinth type deflectors to prevent the entrance of contaminants. Bearing frame shall be designed so that the complete rotating element can be removed from the casing without disconnecting piping. The bearing frame shall be bolted and doweled to the back cover.

9. Mechanical Seal

    a. Mechanical seals shall be supplied by John Crane or Approved equal.

10. Painting

    a. Pump, frame, baseplate, appurtenances, etc. shall receive manufacturer's standard finish paint system prior to shipment.

    b. Machined, polished and nonferrous surfaces shall be coated with corrosion prevention compound.

    c. All scratches and abrasions shall be touched up in the field in accordance with the manufacturer's instructions.

    d. All coatings shall be NSF approved for use in potable water.

    e. All Pump volute internals shall receive Belzona 1341N (Supermetalglide). Pump volute surfaces shall be prepared and coating shall be applied in accordance with Belzona's recommendations.

    f. All equipment and components defined shall receive one prime coat and two finish coats of the manufacturer’s standard paint as per section 09900 or the manufacturer’s standards, whichever is more stringent

11. Pump and Motor Coupling

    a. A coupling shall be provided between the pump and motor capable of transmitting the torque loads between the pump and motor. Sized to transmit the maximum required horsepower with a 1.5 service factor.

12. Pump/Motor Subbase Frame

    a. The pump and motor shall be mounted on a common subbase frame of fabricated ASTM A36 steel. Bent metal or formed bases are not acceptable.

    b. Casing feet shall be either cast integral with the casing or separate bolt on feet capable of carrying and transmitting all static and dynamic loads to the foundation. The casing feet shall be bolted to the steel subbase frame provided by the pump supplier. The subbase frame shall be bolted and grouted into the foundation during installation.

    c. Pump manufacturer shall indicate on the submittal drawings the location and design of anchor bolts required for attachment of the pump/motor subbase to the concrete support foundation along with any necessary foundation modifications. It is the intent to reuse the existing foundation after the top elevations are modified to match the finished floor. Anchor bolts shall be provided that meet the load requirements and at locations that maintain minimum edge distances from the exterior perimeter of the concrete foundations, as required by the anchor bolt supplier.

    d. Pump manufacture shall submit a tabulation of all static and dynamic loads imposed by the subbase frame anchor bolts into the pump concrete foundation.

e. It is assumed that the existing Pump 4 concrete foundation will need to be made longer as shown on the Contract Drawings, in order to accommodate the new subbase frame and meet the required anchor bolt edge distances. CONTRACTOR is responsible for all associated modifications to the foundations, subbase frames, and anchor bolt locations based upon submitted pump.

f. The base shall be provided with a coupling guard, drip lip rim, and ample grout holes.

g. All mounting surfaces shall have a machined finish.

C. Motor

1. The pump supplier shall be responsible for the coordination and supply of the drive motor and all associated hardware.

2. Motor shall be as manufactured by US Motors, or approved equal.
3. Motor shall be TEFC, premium efficiency, horizontal induction, variable torque for a centrifugal pump.

4. Minimum nominal efficiency shall be 95-percent.

5. Maximum motor RPM shall be 1200.

6. Maximum motor horsepower: 600 HP

7. Maximum full load amperage: 680 Amps

8. Motor shall operate from 480VAC, 3-phase power.

9. The motor shall be provided with a non-reverse ratchet to prevent reverse rotation of the pump.

10. The motors shall be designed, constructed and tested in accordance with current applicable requirements of NEMA, IEEE and ANSI standards. They shall be structurally and mechanically coordinated with the pump and sized for all flow conditions.

11. Locked rotor KVA rating shall conform to the requirements of NEMA Code Letter B. Windings shall be copper. Include grounding provisions within the conduit box.

12. Motor shall have Class F insulation and a service factor of 1.15 for inverter duty rated service for operation with a Variable Frequency Drive (NEMA MG1 Part 31). Housing shall be ribbed cast iron.

13. The motor shall be equipped with high temperature grease-lubricated, air-cooled, anti-friction bearings having a minimum L10 life of 20,000 hours as defined by ABMA.

14. Each motor and all components shall receive one priming coat and two finish coats of manufacturer's standard enamel paint system.

15. Pump motor shall be supplied with 120V space heater.

D. Temperature Monitoring Equipment

1. Bearing Sensors: RTD Sensors shall be 100-Ohm P.T. sensors wired to the Pump VFD. Pump Manufacturer shall include external RTD sensors located on all pump and motor bearings (one supplied for each bearing).

2. Motor shall be equipped with 3 normally closed winding thermostats. Thermostats shall be located in either the main outlet box or an equipped auxiliary box.

E. Tools, Spare Parts, and Maintenance Materials:

1. Each pump shall be furnished with the following:

a. One set of wear rings and bearings.

b. One shaft sleeve.

c. One set for mechanical seals.

d. One set of gaskets and O-rings.

e. Special tools required for maintenance (one set only required).

f. A complete set of all fasteners, bolts, nuts, pins, keys, washer and the like which are not of standard manufacture, readily available locally or stock by the manufacturer for delivery within 24 hours.

g. All bearing grease and any other lubricants required for initial operation and two (2) years of operation of one continuously operated pump, properly labeled and boxed

2. Spare parts shall be supplied in sturdy containers with clear indelible identification markings. They shall be stored in a dry, warm location until transferred to the OWNER at the conclusion of the Project

PART 3 EXECUTION

3.1 INSPECTION

A. Duly authorized representatives of the OWNER shall be at liberty at all times to inspect the manufacturer of all components at the respective manufacturing plant. However, such an inspection shall not relieve the CONTRACTOR of furnishing materials conforming to these Specifications. The CONTRACTOR shall submit Certificate of Compliance that all tests and inspections were made and that the materials furnished conform to the Specifications in all respects.

3.2 GENERAL

A. CONTRACTOR shall coordinate all aspects of the Work and perform all operations required for the proper installation of the pumps and equipment including, but not limited to, piping, mounting, alignment, shimming, grouting, leveling, anchor bolts, electrical connections, and the addition of all fluids or lubricants required. Any other miscellaneous work required for proper installation including adjustments to the existing pump station shall also be considered as having been included in the Work.

B. Installation shall be in full accordance with the manufacturer's shop drawings, written and verbal instructions and recommendations, and as directed by ENGINEER. Each piece of equipment shall be installed, adjusted, lubricated, and made completely ready in all respects for operation.

C. Pump packing, seal water, air relief valve shall be piped to drain to existing drain systems with copper piping.

D. It shall be the sole and mutual responsibility of each manufacturer and the CONTRACTOR to coordinate their operations during installation. The OWNER shall not be liable to the CONTRACTOR for any increased compensation, claim, damage, loss or expense sustained by the CONTRACTOR or by the manufacturer, due

to delay in delivery of the equipment. Additional time may be granted to the CONTRACTOR in accordance with the Contract Documents.

E. The CONTRACTOR shall employ competent mechanics experienced in the installation of the type of equipment furnished. All temporary supports, which are required to complete the installation, shall be furnished by the CONTRACTOR under this Section.

F. Make all final alignments, lubrication, adjustments, verification and reporting required to place equipment in proper operating condition, as recommended by manufacturer.

3.3 START-UP SERVICE AND TRAINING

A. Start-up service technician shall be a regular employee of pump manufacturer.

B. As part of the submittal covering this equipment, list the factory service manager, his employee number, his telephone number with extension, and his number of years with the company. List also each start-up service technician, his employee number and years of service with the company.

C. Verify that one or more of the service technicians listed above shall perform the required start-up service on the equipment covered in the submittal.

D. Required Start-up Service per pump; a minimum 1 full day at job site for installation inspection, a minimum 2 full days at job site for start-up or until station is operating to OWNER's satisfaction, and 1 day of training. Training shall be provided on a day separate from startup. CONTRACTOR is responsible for all costs associated with supplying Start-up service technician.

E. Start-up service to include bound O&M manuals as described above.

3.4 PUMP TESTING

A. Upon installation the pump shall be tested for conformance with the above specifications and at the following points:

1. Flow and TDH at design points 1, 2, and shutoff conditions at full speed.
   Note: A downstream valve may need to be partially closed to test for design point 2.

2. Flow and TDH at 75% of full speed.

3. Runout (minimum) head conditions.

B. Contractor supplied new pressure, level and flow transmitters shall be utilized for the test.

C. Owners existing discharge flow meter shall be utilized for the test.

D. Tank level, suction pressure, discharge pressure, discharge flow and motor amperage shall be recorded for all test conditions.

E. Startup Vibration Analysis

1. After installation and as soon as conditions permit full speed operation, CONTRACTOR shall furnish the services of a third party fully experienced independent specialized mechanical vibration testing and analysis firm such as Mechanical Solutions Inc. (MSI) Whippany, NJ, or Engineer approved equal, to perform a detailed vibration signature analysis of each unit(s) in accordance with ANSI/HI 9.6.4. Testing shall include both "Bump Tests" and X-Y vibration profiles, to (a) prove compliance with the

specified vibration limitations and (b) prove there are no field installed resonant conditions due to misalignment, the foundation, or the connecting piping and its supports, when operating at any speed within the specified operating range. Testing shall occur at the design full speed, design minimum speed, and at a maximum of 1-Hz increments between minimum and full speed. A written report shall be submitted including a detailed schematic drawing of the units indicating thereon where and in which direction the vibration readings were taken and recorded showing:

a. Peak-to-peak displacement, in mils.

b. Frequency spectrum.

c. Peak velocity level, in inches per second.

d. Velocity level, in inches per second RMS.

2. The report shall contain a complete analysis of the findings, describing any problem encountered, if any, probable cause, and specific recommendations for any required corrective action.

F. If required, take corrective action and the units shall be retested to ensure full compliance with this Section. All costs associated with the field tests or any required corrective action shall be borne by the CONTRACTOR.

END OF SECTION

SECTION 11316

SUMP PUMPS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnish and install one simplex submersible sump pump systems complete and ready to operate, including pumps, motors, float and control, accessories, spare part, and manufacturer's services in accordance with the following specifications and as shown on the Contract Drawings. One Sump pump shall be replaced in the flow meter chamber.

B. CONTRACTOR is responsible for confined space entry and field verification of existing sump pump operating parameters, prior to ordering and installation of new sump pump equipment. New Sump Pump shall be reconnected to existing piping.

1.2 RELATED SECTIONS

A. Section 01331 – Shop Drawing Procedures

B. Section 01620 – Equipment-General

C. Section 01640 – Transportation And Handling Of Materials And Equipment

D. Section 01660 – Storage Of Material

E. Section 01730 – Installation

F. Section 01731 – Connections To Existing Facilities

G. Section 01751 – Starting And Placing Equipment In Operation

H. Section 01781 – Operation And Maintenance Data

All electrical equipment and wiring shall be in compliance with Divisions 16 unless otherwise specified herein.

1.3 SUBMITTALS

A. Shop drawings in accordance with Sections 01331 and 01620.

B. Performance affidavit and manufacturer's certificates for equipment furnished under this section in accordance with Sections 01331 and 01620.

C. Submit operation and maintenance instructions and manufacturer's instructions in accordance with Sections 01331 and 01620.

D. Manufacturer's shop test certification in accordance with Sections 01331 and 01620.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Shipping

1. Ship equipment, material, and spare parts complete, except where partial disassembly is required by transportation regulations or for protection of components.

2. Pack all spare parts in containers bearing labels clearly designating the contents.

3. Deliver spare parts at the same time as pertaining equipment.

B. Receiving - CONTRACTOR shall inspect and inventory items immediately upon delivery to site and is responsible for storing and safeguarding equipment, material, instructions, and spare parts in accordance with manufacturer's written instructions.

1.5 SPARE PARTS

A. CONTRACTOR shall furnish the following spare parts for the simplex pump system (which are identical to and interchangeable with the original parts) in clearly identified containers:

1. One set of mechanical seals.

2. One set of O-rings.

4. One spare float and cable.

1.6 WARRANTY

A. Provide equipment warranty in accordance with the General Conditions, Supplementary Conditions, and Section 01620.

PART 2 PRODUCTS

2.1 GENERAL

A. The pumping units provided under this section shall be supplied by one manufacturer. Pumping units shall be manufactured by:

1. ITT Goulds

2. Hydromatic

3. Myers, Division of Pentair Pump

4. ABS

B. Pumps shall be provided with stainless steel nameplates, which shall contain the following information:

1. Manufacturer’s name, address, and telephone number.

2. Model number.

3. Serial number.

4. Head, pump capacity, and rpm at rated capacity.

5. Motor horsepower and rpm.

C. Liquid level sensors shall be as specified in this section. All liquid level sensors supplied for the job shall be of the same manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Pumps shall be capable of operating under the following conditions of service:

SCHEDULE OF SUBMERSIBLE SUMP PUMPS

	Simplex Pump System
Location	Flow Meter Chamber (1)
No. of pumping units	2 (one for installation, one for spare to OWNER)
Service	Floor drain
Electrical requirements	Unrated
Minimum pumping rate (gpm)	30
Solids handling capability	Minimum 1-inch
Total dynamic head at minimum pumping rate (feet)	15
Discharge diameter (inches)	1.25 (tie into existing)
Maximum motor speed (rpm)	1750
Maximum motor HP	0.75
Power supply	1 phase, 208 volt
Controls	Simplex Control Panel

2.3 EQUIPMENT DESIGN AND FABRICATION

A. General

1. The pumps shall be of the sealed submersible non-clog type.

2. Pumps shall include a motor, bearings, fittings, spare parts and all accessories specified herein.

3. Pumping units shall be capable of being operated continuously at full load with the wet well liquid level at the top of the pump volute without overheating, cavitation, or vortexing. Pumps requiring the pump motor to be completely or partially submerged in the contents of the wet well to provide cooling are not acceptable. Provide manufacturer's integral cooling jacket if required.

2.4 PUMP CONSTRUCTION

A. Each pump shall be of the sealed, submersible type.

B. The pump motor and seal housing shall be high quality gray cast iron, ASTM A-48, Class 30.

1. Pumps shall have cast iron volute and thermoplastic impeller and shall be of non-clog design with thermoplastic strainer base.

C. The pump inlet shall be open and clear, without screening smaller than the specified solids handling size, to provide access for solids.

D. All external mating parts shall be machined and sealed with Buna-N O-rings.

E. All fasteners exposed to the pumped liquid shall be stainless steel.

F. All power cords shall be water resistant, UL approved, with double insulation and sized as a function of amp draw.

G. Motor

1. The stator, rotor and bearings shall be mounted in a sealed submersible-type housing.

2. Motors shall be polyphase, and shall include an automatic thermal overload protection.

H. Bearings, Shaft, and Mechanical Seal

1. An upper bushing bearing and lower thrust bearing shall be provided.

2. The upper bearing shall be brass or cast iron sleeve and the lower bearing shall be a single row ball bearing.

3. Both bearings shall be permanently and continuously lubricated and cooled by the dielectric oil, which fills the motor housing.

4. The motor shaft shall be steel and sealed from the pumped liquid with a carbon ceramic mechanical seal.

2.5 LIQUID LEVEL SENSORS

A. Liquid level sensors shall be the following:

1. Liquid Level Sensor – Floats

a. Pumps shall be controlled by non-mercury floats.

b. Contacts - A normally open, normally closed mechanical microswitch SPDT (single break) totally encapsulated in epoxy or polyurethane. Mercury switches are not acceptable.

c. Cable - Type STO or SJO cable of sufficient length to reach the control panel with minimum conductor size of 18 AWG.

d. Sufficient excess cable shall be provided with the liquid level sensor to adjust its vertical position.

e. Mount float per manufacturer's instructions.

f. The float shall be set for the following:

1) Pump Start/Stop.

2.6 FABRICATION REQUIREMENTS

A. The equipment shall be shop assembled and tested according to Section 01620.

B. Surface preparation, shop painting and field painting and other pertinent detailed painting specifications shall be in accordance with Section 09900.

C. All bolts, nuts, washers, and other fasteners shall be Type 316 stainless steel unless otherwise noted.

D. Grease fittings shall be standardized in accordance with Section 01620.

E. Nameplates shall be provided for each piece of equipment in accordance with Section 01620.

F. Where it does not affect system performance, all sharp edges of equipment shall be rounded with edge grinding or other means to provide satisfactory paint adherence and prevent injury.

PART 3 EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Install equipment in accordance with the manufacturer's instructions and Section 01620 at the location shown on the Contract Drawings.

B. Verify all dimensions and elevations shown on the Contract Drawings and required for equipment installation. Notify ENGINEER of specific differences and conflicts.

C. Furnish and install all materials (including oil, grease, lubricants, chemicals, etc.) and all temporary equipment (including measuring devices, etc.) required for equipment startup, field testing and initial operation.

3.2 PAINTING

A. Surface preparation and painting shall conform to the requirements of Section 09900.

B. All cast iron parts shall be painted before assembly with a water reducible alkyd air dried enamel. The paint shall be applied in one coat with a minimum thickness of 3 to 4 mils.

3.3 EQUIPMENT TESTING

A. Shop Tests

1. Pumps shall be shop tested by the equipment manufacturer prior to shipment to the job site.

2. Shop testing shall demonstrate that each pump meets the performance requirements specified in this section.

3. In addition to the requirements specified in this section, shop testing shall conform to requirements specified in Section 01620.

B. Field Tests

1. Perform startup, field testing, and initial operation of equipment in accordance with requirements specified in Section 01620.

2. Field testing of equipment shall be conducted in the presence of the ENGINEER and the equipment manufacturer, or their approved representative.

3. Final acceptance shall be based on successful demonstration that the pump meets the specified performance requirements, and that the motor is not overloaded, in all normal operating modes.

4. Adjust, repair, modify, or replace any equipment components that fail to meet specified performance requirements.

3.4 SERVICE OF MANUFACTURER'S REPRESENTATIVE

A. Provide services of the equipment manufacturer or their approved representative in accordance with Section 01620.

B. Provide jointly to the OWNER and the ENGINEER an installation certificate from the equipment manufacturer or its approved representative stating that the equipment has been properly installed and tested to its satisfaction and that all final adjustments required have been made.

END OF SECTION

SECTION 11500

ABOVEGROUND FUEL STORAGE TANK SYSTEM

PART 1 GENERAL

1.1 DESCRIPTION

A. Work Specified

The work specified shall include all labor, materials, tools, equipment, services, and incidentals necessary to furnish and install, secondary-contained aboveground diesel fuel storage tank, fuel day tank system, fuel filtration system, fuel tank monitoring, fuel pump, and appurtenances, as shown on the Contract Drawings and described herein.

B. Related Sections

1. Section 16232 – Diesel Emergency Engine Generator

1.2 QUALITY ASSURANCE

A. Reference Standards

1. UL 2085 Listed “Protected” tank.

2. Ballistics and Impact Protection Per UL 2085.

3. Both the inner and outer steel tanks built to UL standards.

4. National Fire Protection Association (NFPA) 30 & 30A.

5. International Fire Code (IFC).

6. California Air Resources Board (CARB) Standing Loss Control testing requirements for air emissions.

7. Steel Tank Institute (STI) standard F941 for Thermally Insulated Aboveground Storage Tanks.

B. The aboveground storage tank system shall have a 30-year warranty backed by the Steel Tank Institute.

1.3 SUBMITTALS

A. Shop Drawings

1. Submit review drawings and conformance data for all materials to be used in the tank construction and all tank accessories of the aboveground fuel storage tank for review in accordance with Section 01331.

2. Tank gauging panel, heater panel, transfer pumps, filtrations system, fill port, and associated accessories.

B. Operation and Maintenance Data: Submit manuals in accordance with these Specifications.

PART 2 PRODUCTS

2.1 ABOVEGROUND FUEL STORAGE TANK

A. Provide a 3,697-gallon, dual-wall round horizontal steel Aboveground Tank system on heavy skids constructed and listed in accordance with Underwriters Laboratories, Inc. (UL) Standard 2085, Protected Aboveground Storage Tanks for Flammable and Combustible Liquids.

B. Tank shall be fabricated from mild carbon steel with flat-flanged heads. Tank shall have supports that are welded to both tank and skids.

C. Heavy-duty skids shall be fabricated from 6” H-Beam and 6” pipe with pull hooks.

D. The aboveground storage tank must be shop fabricated and tested in accordance with the UL listings, be in accordance with UL-142 and labeled accordingly.

E. All openings shall be from the top only.

F. All exposed metal with the exception of stainless steel must be powder coated to inhibit corrosion.

G. Tank fill port shall include overflow protection in the form of both a direct read level gauge and a high level alarm light.

H. The primary steel tanks shall have "emergency vent" system as per NFPA 30 Code requirements.

I. The aboveground storage tank system shall have two bolts for connecting grounding conductors for lightning protection in accordance with NFPA 780.

J. Overfill Protection: Overfill protection shall be provided by the following methods: a) direct reading level gauge visible from fill pipe access; b) valve rated for pressurized delivery located within fill pipe to close automatically at 95% full level; and c) high level alarm.

K. Signage: Tanks shall be marked on all sides as per state and local codes. Signs will be recessed in concrete exterior to insure against damage during off-loading, refilling or general functions.

L. Tank Accessories

1. Flameshield Kit.

2. 18” Tightbolt manway.

3. 1-inch Fill drop tube with diffuser. 1-inch Return line drop tube with diffuser. 1-inch Suction line drop tube with strainer. 1-inch anti-syphon valves for the supply and the return fuel pipes.

4. Fuel level clock gauge mechanical level indicator and fuel level electronic gauge/probe.

5. 2-inch connection to Day tank and Pumping system.

6. ¾-inch inlet and outlet connections to Automatic Fuel Filtration System.

7. 2-inch Interstitial Monitor Tube.

8. 2-inch non-locking evacuation valve with cap.

9. Vent Package: two (2) 6-inch vents, one (1) primary and one (1) secondary.

10. Seven (7) 4-inch fittings evenly spaced across the top of the tank to accommodate for fill and return lines.

11. Overfill prevention valve/fill port.

12. Tank gauging system to include: interstitial leak monitoring, overfill alarm, high and low fuel level monitoring, remote outdoor high level audible alarm and remote display panel. Panel shall be 120-volt single-phase power. Provide dry contacts or relay for high fuel, low fuel, and interstitial leak alarm.

13. Pipe support angle brackets 12 inches long welded to the tank exterior spaced every 5 feet on center offset from the top center of tank along the east side for support of the fuel supply and return pipes.

M. Manufacturers

1. Highland Tank- Flameshied Series.

2. Or Approved Equal.

2.2 DIESEL FUEL DAY TANK

A. Furnish and install diesel fuel day tank, rupture basin, and duplex fuel pumping system by a single equipment manufacturer.

B. Day tank shall be U/L listed and have a capacity of 350 gallons, with minimum of 150% tank capacity rupture basin to contain liquids resulting from a spill, tank leak, or rupture.

C. Provide a fuel level gauge and alarm system for high/low fuel and alarm relay for remote signal. Alarm shall have dual separate float switches that activate alarm lights on control panel. Low level float switch shall activate when fuel level falls below 75% capacity, high level float switch shall activate when fuel level reaches 102% capacity.

D. Provide leak detection sensor within the rupture basin that will activate alarm on control panel and shutdown pump motor upon the detection of a leak.

E. Reverse flow controller to include the controls, float switch and piping to pump fuel from day tank back to main storage tank.

F. Tank shall have a vent cap and an emergency pressure relief cap with 4” fittings

G. Duplex pump/motor system shall include:

1. Cast iron pump for fuel supply- 8 gallons per minute capacity. Motor shall be electric, single Phase, ½ HP, 115 vac, 60 Hz, thermal protected and fan cooled.

2. Cast iron pump for fuel return- 10 gallons per minute capacity. Motor shall be electric, single Phase, ¾ HP, 115 vac, 60 Hz, thermal protected and fan cooled.

H. Furnish and install a 1” check valve on pump intake to prevent loss of prime and a 1” solenoid valve on the tank inlet to prevent tank flooding.

I. Furnish and install all associated piping, valves, and appurtenances to connect Above Ground Fuel Storage Tank with Day Tank and Emergency Generator.

J. Manufacturers:

1. PRYCO, INC. Model- PY350UL.

2. Or Approved Equal.

K. Hand Pump- Day tank shall include a hand pump

2.4 AUTOMATIC FUEL FILTRATION SYSTEM

A. Furnish and install a stand-alone, factory complete, automated programmable, fuel filtration and maintenance system to optimize and maintain the condition of fuel stored in that tank. The system shall be capable of eliminating microbial contamination and removing water, sediment, and particulate to comply with ASTM D975.

B. All system components shall be contained within a powder coated, weatherproof, outdoor UL 50 listed enclosure with appropriate ventilation. Hinged front door shall be equipped with quarter turnkey lockable handle. Containment basin with leak detection sensor shall be installed. Literature pocket and brackets for wall or rack mounting to be included.

C. System shall be furnished with stainless steel shutoff ball valves on the inlet and outlet for easy filter/water separator maintenance. A flow indicator shall be installed to observe fuel flow and flow rate. All above-mentioned components shall be located within the enclosure. Internal plumbing primarily black iron.

D. System shall provide (2) 1-inch male pipe connections protruding the enclosure for plumbing connection to fuel storage tank. System shall be located as indicated on the Contract Drawings. The fuel oil supply and return lines to the system shall be independent and separate from other fuel lines, with the supply line originating at the bottom of the tank in the deepest spot and the return line as far away as possible from the supply line within the tank.

E. Filtration Process

1. Stage 1: Centrifugal water and particulate separation.
2. Stage 2: Water collection (99.9% water removal) and 30-micron hydrophobic particulate filter element – with water detection sensor and "push and turn" safety drain valve.
3. Stage 3: LG-X Fuel Conditioner – removes ferrous metals from fuel and breaks down sediments and solids naturally forming in diesel fuel to submicron levels.
4. Stage 4: Secondary 3 Micron particulate and/or water adsorbing spin-on filter.

F. Controls and Display

1. System control features, indicator lights and pushbuttons that shall be located on a descriptive external control panel on the front door of the enclosure for easy operator access. Additional alarm and system status information shall be displayed inside the system on the PLC text screen. System shall provide the following control and display functions:

    a. Programmable Digital Timer – Memory backup to retain program memory during power outages.
    b. Pump operating hour counter.
    c. Pump control switch (Auto/Off/Manual) - weatherproof, key operated, front access.
    d. Alarm Reset - weatherproof pushbutton, external access.
    e. Power available - Green indicator, external display.
    f. Pump running - Amber indicator, external display.

g. High vacuum, high pressure, no flow, high water alarm and leak detection - red indicator, external display.
h. Emergency stop push button, red, latching - turn reset, external access.

G. System shall provide dry contacts for summary alarm and leak detection to interface with building alarm system. An external shut down feature shall be provided to control pump operation from a remote point.

H. Pump shall be a positive displacement, spur gear, direct coupled, rotary pump with a flow rate of 4-gallons per minute.

I. Motor shall be UL listed, continuous duty

J. Manufacturers

1. AXI International- Model STS 6004.

2. Or Approved Equal.

2.5 REMOTE FILL PORT

A. Furnish and install remote fill port fuel station within the fuel storage room of the new generator building addition.

B. Remote Fill Port shall consist of a stand-alone factory complete system.

C. Enclosure shall include a hinged door with quarter turn-key lockable handle, 20-gallon containment basin with plugged drain valve, and wall mounting rack.

D. System shall include a 2-inch cam-lock female fitting for filling connection, 2-inch check valve to prevent backflow, 2-inch shutoff ball valve, and 2-inch female pipe connection for connection to diesel fuel storage tank.

E. Remote Fill Port shall be located as indicated on the Contract Drawings.

F. Manufacturers

1. AXI International- Model RFP.

2. Or Approved Equal.

2.6 FILL PUMP STATION

A. Furnish and install Fill Pump Station for Trucks and Portable equipment.

B. Shall be installed on a Pedestal Kit- Fill Rite FRPA125 and include an anti-siphon device

C. Manufacturers

1. Fill Rite- Model FR310VB

2. Or Approved Equal.

2.7 TANK LEVEL MONITORING SYSTEM

A. Contractor shall furnish and install a complete tank level monitoring system complete system by a single equipment manufacturer.

B. Tank Gauging Monitor: Furnish and install one common remote tank gauging and leak detection system that can simultaneously monitor product levels, water levels, temperatures, and leaks in up to eight tanks. System shall be UL listed and provide intrinsically safe output for use in Class 1, Group C & D Hazardous Locations when wired in accordance with manufacturers control drawing. System shall also be Third Party Certified and listed to meet EPA leak detection requirements. Locate monitor console where shown on Contract Drawings.

C. Central Processing and Indicating Instrument – Controller shall have a backlit color touchscreen display and 32-character thermal printer. System must be capable of driving single or multi-tank 12 VDC NEMA 4 X remote audio visual high level alarms and/or remote displays. System must be capable of providing up to three individually programmed isolated relay contacts for any alarm event. The main console shall be preprogrammed by the factory and field adjusted as required. Console shall be equipped with (1) RS-232 port, Ethernet, and e-mail capability for communication. Modbus, additional relays, and 4-20mA output shall be available as options. System shall also be capable of serving up a web page making current inventory, sensor status and alarms available from any web browser or smart phone.

D. Panel shall come equipped with three LED lights for Ok, Warning, and Alarm status. Alarms shall be displayed visually on a color touch screen with wide viewing angle as well as Warning and Alarm lights on face of panel. System shall have an 85dB piezoelectric horn for audible alarm indication.

E. Panel shall be compact in size and constructed of powder coated industrial steel for indoor mounting. The complete leak / level gauging system shall include a minimum one-year parts warranty.

F. Liquid Level Probe: Shall consist of a 316 grade stainless steel IP68 rated rigid model MTG level probes or model MTG-F Kynar flexible level probes where overhead clearance is not available. Probe shall use magnetostrictive technology with six temperature sensing devices and an accuracy of .01 inches in inventory mode and .001 inches in leak detection mode. Probe shall simultaneously provide product levels, water levels, and temperature within the storage tank.

G. The level probe shall be installed in an accessible 4” NPT male riser pipe. Probe shall include a 4” cap with integral cable gland, floats, and installation kit. All splices must use supplied splice kits. Field wiring from probe to controller must be OMNTEC EC-2 or Belden 8761 cable in suitable conduit. Level probes shall be as supplied by OMNTEC Mfg., Inc. OR Approved Equal

H. Leak Sensors: All leak sensors shall be microprocessor based and capable of recognizing its unique serial number, part number, and function. All sensors (up to 16) shall be capable of being installed on (1) four conductor cable back to the main controller. The sensors principle of operation shall be electro optic for liquid detection and conductivity to discriminate fuel and water. Sensors shall be remotely testable from console via touch screen Test button icon. Sensors shall be capable of detecting liquid at any angle. Float technology will not be accepted. Interstitial sensors shall be model # BX-PDWS for steel tank interstitials Containment sump sensors shall be part number BX-PDS. All sensors are to be wired thru conduits using OMNTEC EC-4 cable or 22 gauge four conductors, shielded cable with drain wire.

I. Overfill Station: Provide near each tank fill terminal as shown on project drawings a low voltage audio/visual NEMA 4X overfill alarm and silencing station. Remote annunciator light shall illuminate, and horn shall sound when the liquid level in the tank rises above a preprogrammed high level point. The horn will remain on until the silence button is pressed or can be programmed to time out. Visual light will remain lit until the level in the tank drops below the high level point. Remote annunciator shall be RAS series for single tank.

J. CONTRACTOR is responsible for providing all cabling required to successfully install tank level monitoring system.

K. Tank Level Gauging Monitor Equipment Manufacturers

1. OMNTEC Manufacturing Inc- Proteus K4 (OEL 8000 IIIKP).

2. Or Approved Equal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas, equipment bases, and conditions, with CONTRACTOR present, for compliance with requirements for installation and other conditions affecting aboveground storage tank system performance.

B. Examine piping systems and electrical connections. Verify actual locations of connections before aboveground storage tank system installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with aboveground storage tank system manufacturers' written installation instructions and with NFPA 110.

B. Tank shall be air tested on site by installer, prior to installation.

C. The tank system shall be installed in strict accordance with the manufacturer’s recommendations, industry standards, and applicable fire and environmental codes. All state and local permits shall be obtained prior to installation. The tank system shall be handled, lifted, stored and installed in accordance with the manufacturer’s instructions on a reinforced concrete base slab designed to support the fully loaded tank.

D. Tanks shall be marked on all sides with warning signs and product identification as required by applicable codes.

E. Any unused fitting connections shall be provided with threaded cap.

F. Grounding conductors shall be connected to the two (2) bolts on the tank system for lightning protection in accordance with NFPA 780 and all electrical work shall be in accordance with applicable codes. Contractor shall provide grounding rods and connecting cabling.

3.3 START-UP AND TESTING

A. Coordinate all start-up and testing activities with the ENGINEER and OWNER. After installation is complete, the manufacturer's representative shall perform the following:

1. Verify that the equipment is installed properly.

2. Check all auxiliary devices for proper operation.

3. Provide startup and training for all equipment and systems.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train OWNER's maintenance personnel to operate, and maintain aboveground fuel storage tank system.

END OF SECTION

SECTION 13280

ASBESTOS REMOVAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section defines the minimum requirements for the asbestos materials remediation to be completed as part of demolition operations included in this Contract.

1. Asbestos containing material as identified in Appendix D – Pre-Renovation Asbestos-Containing Materials and Lead-Based Paint Inspection Report.

2. The CONTRACTOR shall provide and maintain temporary protection to keep the Work areas that include asbestos materials contained, at all times, during the performance of the Work. The CONTRACTOR shall be responsible for any damage caused as a result of improper temporary protection for the existing areas.

3. The asbestos abatement shall consist of the removal and disposal of identified Asbestos Containing Material (ACM) in accordance with a New York State Department of Labor Certified Asbestos Project Designer.

4. The CONTRACTOR shall obtain the services of a New York State Department of Labor Certified Asbestos Project Designer holding a valid New York State Asbestos Project Designer certificate pursuant to Subpart 56-2, Part 56, 12 NYCRR. The Project Designer shall be responsible for planning the proper phasing and remediation procedures to be utilized on this asbestos remediation such that all phases of the asbestos project, including but not limited to, abatement, disposal, air monitoring, and final air clearance, are conducted in accordance with all applicable codes and regulations.

1.2 RELATED SECTIONS

A. Section 01010 - SUMMARY OF WORK

1.3 REFERENCES

A. Standards

1. The CONTRACTOR shall comply with the applicable provisions and recommendations of the following. If a contradiction exists between existing codes or this Specification, the more stringent shall apply.

a. The New York State Department of Environmental Conservation (NYSDEC).

b. The United States Environmental Protection Agency (EPA).

1. 40 CFR 61. Subpart A. "General Provisions."

2. 40 CFR 61. Subpart M. "National Emission Standard for Asbestos."

c. New York State Department of Labor (NYSDOL), specifically Asbestos Related Applicable Variances, latest edition.

d. Official Compilation of Codes, Rules, and Regulations of the State of New York (NYCRR).

1. 12 NYCRR Part 56, Industrial Code Rule 56, "Asbestos," latest edition.

2. 6 NYCRR Part 360, "Solid Waste Management Facilities."

3. 6 NYCRR Part 364, "Waste Transporter Permits."

4. 10 NYCRR Part 73, "Asbestos Safety Training Program Requirements."

e. American National Standards Institute (ANSI).

f. Z88.2-80, "Respiratory Protection, latest edition."

g. The Occupational Safety and Health Administration (OSHA).

1. 29 CFR 1910.1001, Asbestos.

2. 29 CFR 1910.1200, Hazard Communication.

3. 29 CFR 1910.134, Respiratory Protection.

4. 29 CFR 1910.145, Specification for Accident Prevention Signs and Tags.

5. 29 CFR 1926, Safety and Health Regulations for Construction.

6. 29 CFR 1926.21, Safety Training and Education.

7. 29 CFR 1926.1101, Asbestos.

8. 29 CFR 1926.500, Scope, Application, and Definitions Applicable to this Subpart (Subpart M - Fall Protection).

h. The Transportation Safety Act of 1975, as amended, Hazardous.

1. Materials Transportation Act.

2. 49 CFR 106, Rulemaking Procedures.

3. 49 CFR 107, Hazardous Materials Program Procedures.

4. 49 CFR 171, General Information, Regulations, and Definitions.

5. 49 CFR 172, Hazardous Materials Tables and Hazardous Materials Communications Regulations.

6. 49 CFR 173, Shippers - General Requirements for Shipments and Packaging.

7. 49 CFR 174, Carriage by Rail.

8. 49 CFR 175, Carriage by Aircraft.

9. 49 CFR 176, Carriage by Vessel.

10. 49 CFR 177, Carriage by Public Highway.

11. 49 CFR 178, Specifications for Packaging.

12. 49 CFR 179, Specifications for Tank Cars.

i. All federal, state, and local regulations not specifically stated.

1.4 QUALITY ASSURANCE

A. Development of an asbestos materials remediation plan. This plan shall be submitted to and reviewed by the New York State Department of Environmental Conservation (NYSDEC). The CONTRACTOR shall adhere to all regulations stated by NYSDEC.

B. A copy of the final plan, upon final approval by the NYSDEC, shall be submitted to the ENGINEER and OWNER. This submittal is for information purposes only and will not be approved by the ENGINEER.

C. The CONTRACTOR shall maintain asbestos project records for at least 30 years pursuant to Subpart 56-1.6(a), part 56, 12 NYCRR, and any applicable variance. One (1) copy of all project records shall be submitted to the ENGINEER in accordance with these Specifications. A second copy shall be submitted to the OWNER in accordance with these Specifications.

1. Each record, at a minimum, shall include:

a. The name, address, Social Security Number, and Asbestos Certificate Number of the Asbestos Project Supervisor and Project Designer.

b. The location and description of the asbestos project.

c. The amount of asbestos containing material that was removed, enclosed, encapsulated, or disturbed.

d. The asbestos project start and completion dates.

e. The name and address of the deposit or waste disposal site or sites where the asbestos waste material was disposed of or deposited.

f. The name and address of any sites used for interim storage of asbestos waste materials prior to final deposit of disposal.

g. The name and address of the asbestos waste material transporters.

h. The names, addresses, social security numbers, and asbestos certificate numbers of all persons engaged in the asbestos project.

i. Any information on required New York State Forms.

1.5 SUBMITTALS

A. Submittals Prior to On-Site Work

1. The CONTRACTOR shall submit to the ENGINEER, within 30 calendar days of the Notice to Proceed, three (3) copies of the documents listed below for record purposes only. The submittals must be clear and legible.

2. Resume: Shall include the following:

    a. Project Designer name and license insured by New York State Department of Labor.

    b. The license of the CONTRACTOR issued by the State of New York.

    c. The number of years the CONTRACTOR has been engaged in asbestos removal.

    d. Provide a list of projects performed within the past 5 years and include the dollar value of all projects. Provide project references to include owner, consultant, air monitoring firm, contact person, address, and phone number.

    e. A complete list of equipment owned by the CONTRACTOR, which will be available for use in the performance of the work.

    f. An outline of the work training course and medical surveillance program conducted by the CONTRACTOR.

    g. A standard operating procedures manual describing work practices and procedures, equipment, type of decontamination facilities, respirator program, specific removal techniques, etc.

3. Citation/Violations/Legal Proceedings

    a. Submit a notarized statement describing the following:

        1. Any citations, violations, criminal charges, or legal proceedings undertaken or issued by any law enforcement, regulatory agency, or consultant concerning performance on previous abatement contracts. Briefly describe the circumstances citing the project and involved persons and agencies as well as the outcome of any actions.

        2. Any Stop Work Orders issued on projects within the past 5 years.

        3. Any litigation or arbitration proceedings arising out of performance on past projects.

        4. Any liquidated damages assessed within the last 5 years.

4. Construction Schedule

    a. Provide an estimate of manpower to be utilized and the time required for completion of each major Work area. Include estimated size and number of crews and work shifts.

5. Notifications

    a. Submit notifications required by federal, state, and local regulations together with proof of timely transmittal to agencies requiring the notice (i.e., certified mail return receipts).

6. Permits

    a. Submit copies of current valid permits required by state and local regulations, including arrangements for storage, transportation, and disposal of contaminated materials.

7. Abatement Work Plan

    a. Provide plans prepared by the NYS Department of Labor Certified Project Designer which clearly indicate all Work areas (numbered sequentially) including the locations and types of all decontamination chambers, entrances, and exits to the Work area, type of abatement activity/technique, number and location of negative air units, and exhaust including calculations, and the proposed location and construction of storage facilities, field offices, and parking area(s).

8. Equipment

    a. Submit the certifications of the manufacturer that vacuums, negative air pressure equipment, respirators, and air supply equipment meet all requirements of OSHA, EPA and ANSI.

    b. Include a description of any equipment to be employed, which has not previously been discussed.

9. Work Training and Medical Surveillance

    a. The CONTRACTOR shall submit a list of the persons who will be employed in the removal Work. Present evidence that workers have received proper training required by the regulations and the medical examinations required by OSHA 29 CFR 1926.1101. Original and all subsequent training records shall be submitted for all persons employed on the project.

10. Logs

    a. Specimen copies of daily progress log, visitor's log, and disposal log.

11. Material List

    a. A complete materials list of all items proposed to be furnished and used under this Contract.

12. Subcontractors List

    a. The CONTRACTOR shall submit a list of all subcontractors, air sampling firms, and testing laboratories to be used on the Project.

13. Material Safety Data Sheets (MSDS)

    a. Submit copies of MSDS for each chemical or material used for the Project (encapsulant, surfactant, mastic remover, etc.).

14. Project Supervisor

    a. Submit the resume of the proposed Project Supervisor.

15. Worker Acknowledgments

    a. Submit statements signed by each employee that the employee has received training in the proper handling of asbestos containing materials; understands the health implications and risks involved; and understands the use and limitations of the respiratory equipment to be used.

B. Submittals During On-Site Work

1. The CONTRACTOR shall submit to the ENGINEER, at the end of each workweek, one (1) copy of the following documents for record purposes. All documents shall be clear and legible.

a. Project logbook entries.

b. Daily sign in sheets.

c. Work area entry/exit log.

d. Personnel documentation for all new personnel employed on the Project, or if existing personnel documentation should expire during the course of the Work.

e. Project correspondence.

f. Air sampling records conducted during the Work if any.

C. Submittals Prior to Final Payment

1. The CONTRACTOR shall submit the following items at the completion of the on-site Work and prior to a request for final payment. Documentation is for record purposes only.

a. Copies of all waste disposal manifests, seals, and disposal logs.

b. OSHA compliance air monitoring records conducted during the Work if any.

c. Copies of the daily progress log.

d. Copies of the visitor’s log.

e. Certificate of Visual Inspection.

f. Copies of any required Employee Statements such as Medical Examination Statement, Certificate of Worker's Release, or Employee Training Statement.

g. Any pre-work or on-site submittals not previously submitted as directed by the ENGINEER.

1.6 PRECONSTRUCTION CONFERENCE

A. Prior to start of preparatory Work under this Contract, the CONTRACTOR shall attend the preconstruction conference and walk-through attended by the OWNER, ENGINEER, Project Designer, and Testing Lab Air Sampling Technician.

B. Agenda for this conference shall include, but not necessarily be limited to, the following:

1. Scope of Work, work plan, and construction schedule, including the number of workers and number of shifts, of the CONTRACTOR.

2. The safety and health precautions to be employed by the CONTRACTOR, including but not limited to, protective clothing and equipment and decontamination procedures.

3. The air monitoring plan of the testing laboratory.

4. The Work procedures of the CONTRACTOR including, but not limited to, the following: Methods of job site preparation, wetting agents and procedures, and removal methods; respirator procedures; procedures for decontaminating the objects in the "decontamination and abatement" sections, methods of hauling removed material and disposal procedures; cleanup procedures and equipment; protection of the operation of the OWNER; signs and labels; fire exits and emergency procedures.

5. Plan developed by the CONTRACTOR for 24-hour job security both for prevention of theft and for barring entry of curious, unprotected personnel into Work Areas.

6. Temporary utilities.

7. Handling of movable objects.

8. Documentation of compliance with environmental laws and standards.

9. Storage of removed Asbestos Containing Material.

C. In conjunction with the conference the CONTRACTOR shall accompany the OWNER and ENGINEER on a preconstruction walk-through documenting existing condition of finishes and furnishings, reviewing overall work plan, location of fire exits, fire protection equipment, water supply, and temporary electric tie-in.

1.7 INFORMATIONAL MEETING REQUIREMENTS

A. The CONTRACTOR shall, at least one (1) week prior to performing Work onsite, conduct an on-site meeting with the OWNER, ENGINNER, and Plant Operational Staff.

1. Meeting shall be approximately one (1) hour in duration.

B. Meeting shall be fully coordinated with the OWNER, with respect to date, time, and location of the meetings.

C. Each meeting shall include, but not be limited to, the following:

1. A full explanation of asbestos containing materials including the health effects, and asbestos remediation procedures.

2. A detailed accounting of the scope of work involved in this Project including, but not limited to, the areas affected by the Work, the methods employed by the CONTRACTOR in performing the Work, and safety procedures for the employees to follow during the course of the Work.

3. A timetable for completion of the Work.

1.8 JOB CONDITIONS

A. The CONTRACTOR shall take special care to ensure that the Work area is not breached in any way that would allow ACM to migrate into non-Work areas.

B. The CONTRACTOR shall provide security following the final air clearance. If final air clearance is unsatisfactory, the CONTRACTOR shall be responsible for recleaning the area and for any cost incurred for additional air monitoring, project monitoring, and any administrative costs incurred by the OWNER or the ENGINEER.

C. The Facility is continuously operating, as such, NO shutdown or interruption of the operations of the OWNER shall be allowed under any circumstances.

D. Notification

1. At least 72 hours prior to the commencement of removal the CONTRACTOR shall notify the ENGINEER in writing of his proposed schedule thereafter. No removals shall begin without the permission of the ENGINEER.

1.9 NOTICE AND PERMITS

A. The CONTRACTOR shall provide notification of intent to work on ACM and distribute it as indicated below and in accordance with the specifications of the Project Designer.

1. At least 10 business days prior to beginning Work on the asbestos containing materials, send written notification to the Environmental Protection Agency, National Emissions Standards for Hazardous Air Pollutants (NESHAPS) Coordinator in accordance with 40 CFR 61.745(a) & (b). Proof of agency receipt, such as certified mail receipt, shall be provided to the ENGINEER.

2. At least 10 days prior to beginning work on the asbestos containing materials, send written notification to the New York State Department of Labor, Division of Safety and Health, Asbestos Control Bureau in Albany, New York. Proof of agency receipt, such as certified mail receipt, shall be provided to the ENGINEER.

3. At least 10 days prior to the commencement of asbestos removal Work, the CONTRACTOR shall post written notification to building occupants. Written notification shall be posted at all direct means of access to the floor where Work is being performed.

B. The notifications shall include, but not be limited to, the following information.

1. Name and address of the OWNER.

2. Name, address, and asbestos license number of the CONTRACTOR.

3. Address and description of the building, including its size and age, amount of asbestos material to be removed in square feet, and the nature of the Work of the Contract.
4. Scheduled starting and completion dates for mobilization, set up, removal, and disposal.

5. Procedures that will be employed to comply with applicable regulations.

6. The name and address of the waste hauler and disposal site where asbestos will be deposited.

7. Any additional information required by the Project Designer.

C. Obtain an annual "Industrial Waste Hauler Permit" specifically for asbestos containing materials, pursuant to 6 NYCRR 364, for transporting of waste asbestos containing materials to a disposal site. Asbestos containing materials to be transported shall be packaged in accordance with Environmental Protection Agency requirements and as specified by the Project Designer.

D. Consult with the local fire/rescue department in the preparation of the Emergency Procedures Plan for fire or medical emergencies. Notify the local fire rescue department 7 days prior to the start of the asbestos removal Work. Notification shall also be made when the removal Work is completed.

E. The CONTRACTOR must display, at all times, a valid New York State Asbestos Handling License pursuant to 12 NYCRR, Part 56, Subpart 56-2.

F. The CONTRACTOR must have and submit proof, upon request, that any persons employed by the CONTRACTOR to engage in or supervise work on any asbestos project have a valid NYS asbestos handling certificate pursuant to 12 NYCRR, Part 56, Subpart 56-2.

G. The CONTRACTOR shall designate a fully certified and fully competent full-time Project Supervisor who shall be on-site at all times. If the Project Supervisor is not on-site, the Work shall be stopped.

1. The Project Supervisor must be able to read and write English fluently, as well as communicate with the workers.

2. The Project Supervisor shall remain until the Project is complete.

3. The Project Supervisor cannot be removed without the written consent of the OWNER and the ENGINEER.

4. The Project Supervisor shall meet the requirements of a "Competent Person" as defined by OSHA 1926.1101 and shall have a minimum of one (1) year on-the-job training.

5. This person shall hold New York State certification as an Asbestos Supervisor, and shall be able to produce, at any time during the Project, proof of current certification.

1.10 MEDICAL REQUIREMENTS

A. Before exposure to airborne asbestos fibers, provide workers with a comprehensive medical examination as required by 29 CFR 1910.1001 and 29 CFR 1926.1101. This examination is not required if adequate records show the employee has been examined as required by 29 CFR 1910.1001 and 29 CFR 1926.1101 within the past one year. The same medical examination shall be given on an annual basis to employees engaged in an occupation involving asbestos fibers and within 30 calendar days before or after the termination of employment in such operations.

B. As required by 29 CFR 1910.1001 and 29 CFR 1926.1101 maintain complete and accurate records of employees' medical examinations for a period of 30 years after termination of employment and make records of the required medical examinations available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health, the Director of the National Institute for Occupational Safety and Health (NIOSH), authorized representatives of either of them, and an employee's physician upon the request of the employee or former employee.

1.11 TRAINING

A. As required by regulations, prior to assignment to asbestos work, instruct each employee, under the direction of an Industrial Hygienist (IH) with regard to the hazards of asbestos, safety and health precautions, and the use and requirements of protective clothing and equipment. Fully cover engineering and other hazard control techniques and procedures.

B. Every employee who works on the asbestos project shall have successfully completed an EPA accredited asbestos training course within the previous year.

C. Establish a respirator program, as required by ANSI Z88.2 and 29 CFR 1910.134, and 29 CFR 1926.1101. Provide respirator training and fit testing under IH direction. The CONTRACTOR shall submit to the OWNER proof of respirator training and fit testing.

1.12 THIRD-PARTY AIR MONITORING

A. The OWNER shall provide a third-party, independent air sampling firm and testing laboratory for any required monitoring of airborne concentrations of asbestos fibers during the course of asbestos abatement as required by 12 NYCRR part 56. All fees for the independent sampling and testing shall be borne by the OWNER.

B. The CONTRACTOR is required to ensure cooperation of its personnel with the Air Sampling Technician (AST) for air sampling and testing of the work area.

1.13 INDEPENDENT PROJECT MONITORING

A. The OWNER may, at any time during the Project, retain the services of a New York State Department of Labor licensed and certified Independent Project Monitor (IPM) to provide periodic site inspections, documentation review, and general consulting services. The IPM shall be provided for under separate contract by the OWNER.

B. The CONTRACTOR shall cooperate fully with the Independent Project Monitor(s) during the course of Work. Failure to cooperate fully may lead to the issuance of a Stop Work Order. Any liquidated damages incurred as a result of any Stop Work Order issued shall be the responsibility of the CONTRACTOR.

C. The IPM shall oversee Work practices and ensure compliance to all applicable regulations, standards, and the Contract Documents.

D. The IPM shall review all Project submittals as submitted by the CONTRACTOR. Applicability, completeness, and thoroughness shall be reviewed and written comments/approvals shall be issued to the CONTRACTOR by the IPM.

E. The IPM shall inspect each Work area prior to, during, and at the completion of asbestos abatement work. A Work site inspection form will be issued to the CONTRACTOR following each Work area inspection. The Project Monitor must give written approval to the CONTRACTOR prior to beginning asbestos removal work and must give written approval to the air sampling technician to begin final clearance air sampling. The CONTRACTOR is responsible for continuously informing the IPM of on-going progress of the Project, and scheduling the final visual inspection of each Work area prior to running final clearance air samples.

F. The Independent Project Monitor shall maintain a detailed Project logbook. The logbook shall include a chronological record of site visits, inspections, correspondence, and general information on the Project. Details of personnel on site, explanations of unusual occurrences, meetings, phone conversations, etc. shall be documented. A photographic record of the Project shall also be maintained.

G. The IPM shall compile all project records into a project records manual at the completion of the Project. Records shall include but not be limited to the following: air sampling records; asbestos abatement records and submittals of the CONTRACTOR; Independent Project Monitor's records; waste shipment and disposal records; and site photographs; as well as any other pertinent records documenting compliance to applicable regulations, and the Contract Documents.

H. The project records' manual shall be submitted to the OWNER in draft form for review. Upon approval, the IPM shall complete the project records manual, and submit three (3) bound copies to the OWNER.

PART 2 PRODUCTS

2.1 RESPIRATORS

A. Select respirators from those approved by the Mine Safety and Health Administration (MSHA) and the National Institute for Occupation Safety and Health (NIOSH), Department of Health and Human Services.

B. Respirators shall be fit-tested to personnel by the Industrial Hygienist (IH). Fit-tested respirators shall be permanently marked to identify the individual fitted and use shall be limited to that individual.

C. All persons who enter an OSHA defined class one work area shall be required, at a minimum, to wear powered air purifying respirators (PAPR). A respirator offering a lower protection factor may be worn when the CONTRACTOR has obtained a negative exposure assessment in accordance with OSHA 29 CFR 1926.1101, (f), (2), (iii), (C) and has proven that exposure will not exceed the maximum use concentration of the chosen respirator as indicated in paragraph J of this part.

D. No respirators shall be issued to personnel without such personnel participating in a respirator training program.

E. High Efficiency Particulate Air (HEPA) respirator filters shall be approved by NIOSH and shall conform to the OSHA requirements in 29 CFR 1910.134 and 29 CFR 1926.1101.

F. The CONTRACTOR shall provide and make available a sufficient quantity of respirator filters so that filter changes can be made as necessary during the Workday. Filters will be removed and discarded during the decontamination process. Filters cannot be reused. Filters must be changed if breathing becomes difficult.

G. Filters shall not be used any longer than one 8-hour workday.

H. Respirator filters shall be stored at the Project site in the change room of each Work area and must be protected from asbestos exposure prior to use.

I. Where not in violation of NIOSH and OSHA requirements the CONTRACTOR shall provide the minimum respiratory protection to the maximum use concentrations indicated in OSHA 29 CFR 1926.1101 Section (h.) Respiratory Protection, Part (2.) Respirator Selection, (iii) including Table 1 - Respiratory Protection for Asbestos Fibers.

2.2 PROTECTIVE CLOTHING

A. Provide personnel exposed to airborne concentrations of asbestos fibers with disposable protective whole body clothing, head coverings, gloves and foot coverings. Provide disposal plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber for comfort, but shall not be used alone. Make sleeves secure at the wrists and make foot coverings secure at the ankles by use of tape or provide disposable coverings with elastic wrists or tops.

B. Provide sufficient quantities of protective clothing to assure a minimum of four (4) complete disposable outfits per day for each individual performing abatement work.

C. Eye protection and hard hats shall be provided and made available for all personnel of the CONTRACTOR entering any Work Area.

D. Inspector Employed by the OWNER:

1. The CONTRACTOR shall furnish, for the daily use of the inspector, the following as a minimum:

    a. Suitable disposable protective clothing including gloves.

    b. Hard hat.

    c. Respirator.

    d. Daily respirator filter(s).

    e. Eye protection.

    f. Disposable footwear.

    g. Any other required daily protective gear.

E. Authorized Visitors:

1. Any representative of the OWNER, or any regulatory or other agency having jurisdiction over the Project shall be considered an authorized visitor.

2. Authorized visitors shall be provided, by the CONTRACTOR, suitable protective clothing, headgear, eye protection, respirators, and footwear whenever they are required to enter the Work area.

3. The CONTRACTOR shall have at least two (2) additional respirators stored on site designated for authorized visitors use. Appropriate respirator filters for authorized visitors shall be made available by the CONTRACTOR.

2.3 SIGNS AND LABELS

A. The CONTRACTOR shall provide warning signs and barrier walls at all approaches to asbestos control Work areas. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide asbestos warning labels affixed to all asbestos materials, scrap, waste, debris and other products contaminated with asbestos.

1. Provide warning signs in vertical format conforming to 29 CFR 1926.58, minimum 20 inches by 14 inches, displaying the following legend:

DANGER
ASBESTOS

CANCER AND LUNG DISEASE
HAZARD

AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE
CLOTHING ARE REQUIRED IN THIS
AREA

2. Provide asbestos DANGER labels of sufficient size to be clearly legible, displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS

AVOID CREATING DUST
HAZARD

3. Provide the following asbestos labels, of sufficient size to be clearly legible, for display on waste container (bags or drums) which will be used to transport asbestos contaminated material in accordance with United States Department of Transportation 49 CFR Parts 171 and 172:

RQ
HAZARDOUS
SUBSTANCE
SOLID, NOS
ORM-E, NA 9188
ASBESTOS

4. Provide 3-inch wide yellow barrier tape printed with black lettered "DANGER ASBESTOS REMOVAL". Locate barrier tape across all corridors, entrances and access routes to asbestos work area. Install tape 3 feet to 4 feet above floor level.

5. Provide login sign at entrance to clean room with legend:

   ALL PERSONS ENTERING WORK AREAS
   ARE REQUIRED TO SIGN IN

6. Label waste containers with the name of the generator and location at which the waste was generated.

2.4 LOG BOOK

A. The CONTRACTOR shall provide a permanently bound log book which shall contain the following: on title page the Project name, name, address and phone number of OWNER; name, address and phone number of CONTRACTOR; name, address and phone number of Project Designer and Air Sampling Firm and/or analytical laboratory; emergency numbers including, but not limited to local Fire/Rescue department. Logbook shall contain a list of personnel approved for entry into the Work area and shall contain copies of all MSDS sheets.

B. All entries into the log shall be made in non-washable, permanent ink. Such pen shall be strung to or otherwise attached to the log to prevent removal from the login area. Under no circumstances shall pencil entries be permitted.

2.5 DISPOSAL BAGS, DRUMS, AND STORAGE BAGS

A. Provide, at a minimum, 6 mil polyethylene disposal bags printed with asbestos caution labels.

B. Provide 30- or 55-gallon capacity fiber or metal drums capable of being sealed air and water tight if asbestos waste has the potential to damage or puncture disposal bags. Affix asbestos caution labels on lids and at one-third points around drum circumference to assure ready identification.

C. Labeled bags or containers shall not be used for non-ACM debris or trash. Any material placed in labeled bags or containers, whether turned inside out or not, shall be handled and disposed of as ACM waste.

D. Label waste containers with the name of the generator and location at which the waste was generated.

2.6 HEPA VACUUM EQUIPMENT

A. All dry vacuuming performed under this Contract shall be performed with High Efficiency Particulate Absolute (HEPA) filter equipped industrial vacuums conforming to ANSI Z9.2.

B. Provide tools and specialized equipment including scraping nozzles with integral vacuum hoods connected to a HEPA vacuum with flexible hose.

C. If an abrasive shot blasting machine is to be used for mastic removal, it shall be only used with the HEPA filter attachment.

2.7 POWER TOOLS

A. Any power tools used to drill, cut into, or otherwise disturb asbestos material shall be equipped with HEPA filtered local exhaust ventilation.

2.8 PLASTIC SHEETING

A. All plastic sheeting used on the Project (including, but not limited to, sheeting used for critical and isolation barriers, fixed objects, walls, floors, and ceilings) shall be at a minimum 6 mil fire retardant sheeting.

B. Decontamination enclosure systems shall utilize at least 6 mil fire retardant plastic sheeting. At least two (2) layers of 6 mil reinforced fire retardant plastic sheeting shall be used for flooring.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. Perform asbestos related Work in accordance with New York State Industrial Code Rule 56, 29 CFR 1910.1001, 40 CFR 61, 29 CFR 1926,1101 and as specified by Project Designer. Where more stringent requirements are specified, adhere to the more stringent requirements.

B. Should the area beyond the asbestos Work area(s) become contaminated with asbestos-containing dust or debris as a consequence of the Work, immediately institute emergency procedures. Contaminated non-Work areas shall be isolated and decontaminated in accordance with procedures established for asbestos removal. All costs incurred in decontaminating such non-Work areas and the contents thereof shall be borne by the CONTRACTOR, at no additional cost to the OWNER.

C. Medical approval and certificates of training shall be on file prior to admittance of any individual to the asbestos Work area. Individuals approved for entry into the Work area shall be listed in the logbook and sign in prior to entry.

D. Prior to start of asbestos abatement work, shut down and lock out the building heating, ventilating, and air conditioning system. Provide temporary electric as specified herein.

E. The following documents shall be posted in the clean room of the decontamination enclosure:

1. Company License.

2. Daily personal air monitoring results.

3. Workers Certifications.

4. Medical Records.

5. Fit Test Reports.

6. Project Specifications.

7. Project Drawings.

8. Notifications and Variances.

9. Applicable Regulations.

3.2 PREPARATION

A. Provide asbestos warning and/or danger signs at all approaches to the asbestos Work area. Post all emergency exits as emergency exits only on the Work area side, post with asbestos caution signs on the non-Work area

side. Provide all non-Work area stairs and corridors accessible to the asbestos Work area with warning tapes at the base of the stairs and beginning of corridors. Warning tapes shall be in addition to caution signs.

3.3 DELIVERY AND STORAGE

A. Deliver all materials to the job site in original packages with containers bearing the name and label of the manufacturer.

B. Store all materials at the job site in a suitable and designated area. Store materials subject to deterioration or damage away from wet or damp surfaces and under cover. Protect materials from unintended contamination.

C. Remove damaged or deteriorated materials from the job site. Materials contaminated with asbestos shall be disposed of as asbestos debris as specified herein.

3.4 TEMPORARY UTILITIES

A. Provide temporary 120 VAC, single phase, three-wire, electric service with Ground Fault Circuit Interrupters (GFCI) for all electric requirements within the asbestos Work area as required. Obtain electric power from the existing power system of the OWNER. No fee for power usage will be charged to the CONTRACTOR. Provide temporary wiring and weatherproof receptacles in sufficient quantity and location to serve all HEPA vacuum equipment, tools, and air monitoring equipment.

B. Provide temporary lighting with weatherproof fixtures for all Work area including decontamination chambers as required.

C. All temporary devices and wiring used in the Work area shall be capable of undergoing decontamination procedures including HEPA vacuuming and wet wiping.

D. Provide temporary water for the Work area as required. Obtain water from the existing system of the OWNER. No fees for water will be charged to the CONTRACTOR.

3.5 REMOVAL OF ABESTOS CONTAINING MATERIALS

A. Remove asbestos containing materials in accordance with the work plan of the Project Designer.

B. Perform loading, shoveling, or otherwise disturbing any asbestos containing debris in a manner to minimize the dispersal of asbestos fibers into the air. Use equipment and methods specifically designed to limit generation of airborne asbestos particles. All removed material shall immediately be placed into 6 mil plastic lined dumpster or truck.

3.6 PERSONNEL DECONTAMINATION

A. Access to and from the asbestos Work area shall be as required by Project Designer.

B. Workers shall sign the entry/exit log upon every entry and exit of the Work area.

C. All workers, without exception, will change work clothes at designated areas prior to the start of Work. Lockers or other acceptable substitutes shall be provided by the CONTRACTOR for the employees street and work clothing.

D. All work clothing shall be removed in the Equipment area in accordance with Industrial Code Rule 56. Workers must then proceed to the shower area. Workers must shower before lunch and at the end of their shift. The CONTRACTOR shall provide hot water, clean towels, soap, and hygienic conditions.

E. No smoking, eating, or drinking shall occur beyond the Clean Room at the job site. Prior to smoking, eating, or drinking the workers must fully decontaminate by showering. Each worker will then dress into a new, clean, disposable coverall to eat, smoke, or drink. The new coverall can then be used to re-enter the Work area.

F. Adequate toilet facilities shall exist in the Work area to avoid decontamination for this purpose. The CONTRACTOR shall provide portable services if such facilities do not exist.

G. Procedures shall be established for the evacuation of injured workers. Aid for a seriously injured worker will not be delayed for reasons of contamination.

3.7 EQUIPMENT AND WASTE CONTAINER DECONTAMINATION AND REMOVAL PROCEDURES

A. External surfaces of contaminated containers and equipment shall be cleaned by wet cleaning and/or HEPA vacuuming in the work area before moving such items off site.

B. If a remote waste decontamination enclosure system is utilized, it shall be placed contiguous to the regulated Work area. The waste decontamination system shall remain in place until final Work area clearance air monitoring results have been achieved.

C. All wastewater shall be collected and filtered through a filtration unit with at least a 5-micron filter prior to discharge.

3.8 RESTORATION OF UTILITIES

A. After final clearance all temporary power shall be disconnected, power lockouts removed, and power restored. All temporary plumbing shall be removed.

3.9 RESTORATION OF FINISHES

A. Finishes damaged by asbestos removal including, but not limited to, plaster/paint due to taping of polyethylene sheeting, shall be restored prior to final payment. Finishes unable to be restored shall be replaced under this Contract.

END OF SECTION

SECTION 14602

OVERHEAD BRIDGE CRANE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnishing and installing new overhead bridge crane.

B. Regulatory codes and requirements.

1.2 DESCRIPTION

A. Work Specified

1. The CONTRACTOR shall furnish all labor, materials, equipment, and incidentals necessary for the replacement of the existing 10-ton crane located on the Guenther Pump Station Operating Floor. The new Crane shall be a single girder top running with underhung hoist.

2. This item includes but is not limited to the end trucks, bridge beam, trolley, conductor bar, electric hoist, drive, radio controls and all other associated equipment required to furnish and install the replacement of the 10-ton bridge crane. Furnishing and installation of the 10-ton overhead bridge crane shall be coordinated by a single equipment manufacturer.

1.3 RELATED SECTIONS

A. Section 01620 - Equipment-General

B. Section 05500 - Metal Fabrications

C. Section 09900 - Painting

1.4 SUBMITTALS

A. Submit single-page catalog cuts clearly indicating items to be furnished, including maintenance and electrical requirements.

1. Include annotated catalog cuts and drawings for all hoists, trolleys, conductor bar, controls and other accessories.

B. Submittals shall include drawings and calculations signed and stamped by a Professional Engineer Licensed in the state of New York. Submittals shall include but are not limited to; calculations, crane/hoist capacity limits, dimensions, bill of materials, drawings, electrical/control panels and components, wiring diagrams, and associated details.

C. Operation and Maintenance Data: Submit manuals in accordance with these Specifications.

1.4 REFERENCES

A. ASTM-A759 Crane Rails, Carbon Steel.

B. ASME HST-4 Performance Standard for Overhead Electric Wire Rope Hoists

C. American Institute of Steel Construction (AISC).

D. American Welding Society (AWS).

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Coordination and installation of Crane equipment shall be as manufactured by Simmers Crane or approved equal.

B. Hoist equipment shall be as manufactured by R&M Materials Handling, or approved equal.

C. Conductor Bar shall be manufactured by Magnetek or approved equal.

D. Radio Controls shall be manufactured by Magnetek Material Handling- Model Flex EX2 Series, or approved equal.

2.2 EQUIPMENT DESIGN AND FABRICATION

A. Capacity

1. The capacity of the crane shall be permanently marked in a conspicuous manner on the bridge beam.

2. The hoists shall lift their rated capacities with a smooth and continuous operation without speed changes or vibration throughout the entire lifting height.

B. Durability: The hoist shall have an H-4 heavy-duty service rating, the crane shall be CMMA Class C.

C. Operating Conditions

1. Crane shall be designed to operate at a minimum ambient temperature of -10 degrees C (14 degrees F) to a maximum ambient temperature of 40 degrees C (104 degrees F).

D. Materials

1. Hoist

a. Hoist mechanism shall be hook-on type lightweight aluminum body, high speed, spur geared, ball or roller bearing, hand-operated chain hoist with a retaining brake built into the hoisting mechanism and shall be fully enclosed, suitable for outdoor use and storage in a corrosive environment.

b. Hook shall be of high-grade forged steel construction and shall have swivel anti-friction bearings and safety clips. Hook shall include a limit switch to limit traveling distance of the hook.

c. The load wheel shall have accurately formed chain pockets to fit the load chain.

d. Hoist operating wheel shall be provided with chain guides and the chain shall be of sufficient length to hang 1 foot above the pump station basement floor.

e. Pull required to lift the rated load shall not exceed 85 pounds.

f. The load and operating chains shall be stainless steel for corrosion resistance and the load chain shall have a load safety factor of at least 5 to 1.

g. Hoist shall be equipped with a disc brake designed to bring the load to a smooth and quick stop and hold the load when the motor is not energized.

h. Hoist gear reducer shall be equipped with a multistage gear transmission through a drum gear.

i. Hoist shall include a limit switch device to allow the setting of the hoist to travel within a prescribed travel range.

j. Hoist shall include a mechanical overload device designed to protect against damage from attempts to lift an over capacity load.

k. Manufacturer shall be R&M Equipment or equal.

2. Hoist Trolley

a. Trolleys shall have four or more wheels and have sides extending beyond the wheel flanges to provide bumper protection.

b. Wheels shall have machined treads, surface hardened to Brinell hardness of 400, and set at the proper angle to bear the load evenly.

c. Wheels shall be provided with lifetime lubricated ball or roller bearings.

d. Trolleys shall be compatible with the track and associated equipment provided by the CONTRACTOR.

e. Trolleys shall be abrasive blasted and epoxy painted for corrosion protection.

3. End Trucks

a. End Trucks frame, wheels, axles, bumpers and drive as recommended by equipment manufacturer.

b. Manufacturer: End Trucks shall be by R&M Materials Handling Inc., or approved equal.

4. Conductor Bar

a. Conductor bar shall be large enough to carry the necessary ampere load safely without undue heating.

b. Conductor Bar shall be installed on runway girder as recommended by hoist manufacturer.

5. Controls

a. Controls shall be radio signal type as recommended by hoist manufacturer.

6. Bridge Girder

a. Bridge Girder shall be designed by the crane builder to meet the existing span and capacity conditions. Maximum allowable deflection shall not exceed 1/888 of the span.

2.3 EQUIPMENT DESIGN AND FABRICATION

Technical Data below is provided for reference only during the bidding process. All dimensions, tolerances, and parameters shall be field verified by the CONTRACTOR prior to equipment installation.

PARAMETER	VALUE
Capacity	10 tons
Span	39 feet
CMAA Class	Class- C
Rail Size	40-lb ASCE
Runway Length	77 feet- 6 inches
Hoist Speed	3.2 ft/min – 20 ft/min, 2-speed contactor controlled
Trolley Speed	65 Ft/min, VFD
Bridge Speed	100 Ft/min, VFD
Max Static Wheel Load	11.9 kips
Height- Floor to Low Obstruction	17 feet-6 inches
Height- Floor to Top of Rail	14 feet
Clearance- Wall to Center of Rail	8.5 inches
Existing Wheel Base	7 feet
Power	460 V, 3-Phase

PART 3 EXECUTION

3.1 PAINTING

A. All steel components and accessories shall be abrasive blasted and epoxy painted for an exterior/corrosive environment.

B. After complete installation and preliminary testing, provide touch-up or repainting of all components, refer to requirements of specification 09900.

3.2 EQUIPMENT INSTALLATION

A. Field Measurements and Dimensions - All measurements and dimensions shall be based on verified field conditions. Verification shall include examination of adjoining work.

B Erection - The equipment shall be erected by the CONTRACTOR in accordance with the instructions of the manufacturer.

1. In addition to the general requirements of Section 01640 and the foregoing paragraphs; hoist equipment shall be shipped, assembled and constructed as follows:

a. All bolts shall be furnished and installed by the CONTRACTOR and shall be of ample size and strength for the purpose intended.

b. All parts of the equipment shall be amply proportioned for all stresses that may occur during fabrication, erection and intermittent or continuous operation.

c. The equipment shall be assembled by the manufacturer insofar as is practical and shipped in units, which will minimize erection costs.

3.3 INSTALLATION AND TESTING

A. Equipment shall be shop assembled and shop tested to the fullest extent possible prior to shipment to the job site.

B. Installation shall include all necessary oil and grease for initial operation.

C. Prior to turning the installation over to the OWNER, the entire installation shall be tested for the following conditions:

1. No-load operation in all moving stages for a period of 30 minutes.

2. Operate and load test at 125 percent of field rated load capacity for at least 20 minutes, demonstrating starting hoisting, lowering, travel speed and lifting speeds.

3. Suspend the rated load from the hook, held solely by the hoist brake, for a period of 10 minutes without change of position.

4. The equipment shall demonstrate compliance with pertinent codes and specifications, that it has been properly erected and adjusted, and that it is ready for service.

5. Should any defects develop during the tests, they shall be corrected at the CONTRACTOR's expense.

D. Tests, trials and initial operation shall be performed as set forth in Section 01620.

3.4 SERVICES OF MANUFACTURER'S REPRESENTATIVE

A. Manufacturer's representative services shall be provided in accordance with Section 01620 and as specified herein.

1. To assist with initial installation and startup, an equipment manufacturer representative shall be on site to provide assistance to the CONTRACTOR. CONTRACTOR is responsible for all costs associated with supplying manufacturer's representative services.

2. After initial startup and during the first year of operation, a representative of the manufacturer shall make one visit to the plant for not less than ½ day.

3. The purpose of this visit shall be to review equipment operation, assist the operators and inspect the equipment installation.

4. Should the system or any of its components fail to operate satisfactorily for any reason other than proven OWNER negligence, the CONTRACTOR shall make such repairs, replacements, or other modifications as required to render the system satisfactory.

3.5 USE BY CONTRACTOR

A. If crane is used by the CONTRACTOR, it shall be repaired, repainted, and otherwise refurbished to like new condition prior to its acceptance. The CONTRACTOR assumes all responsibility for operation and maintenance until the crane has been accepted by OWNER.

3.6 EQUIPMENT SCHEDULE

A. All equipment furnished under this section shall be in accordance with the equipment schedule in Section 3.6 below.

3.7 SCHEDULE OF HOISTING EQUIPMENT

A. Manual conversion and replacement to motorized operation

LOCATION	CAPACITY (TONS)	HOOK HEIGHT ABOVE OPERATING FLOOR (FEET)	LIFT (FEET)	REMARKS
Guenther Pump Station Operating Floor	10	13	29	Replace existing manual double girder crane with motorized single girder crane with underhung hoist and radio control system. Crane shall be able to lower/raise equipment to/from the operating and basement floor.

END OF SECTION

SECTION 15051

BURIED PIPING INSTALLATION

PART 1 GENERAL

1.1 DESCRIPTION

A. Work Specified

1. The work specified shall include all labor, material, equipment, services and incidentals necessary to furnish and install watermain, drainage pipe, specials and fittings, and to perform interconnections as shown on the plans and specified herein.

B. Related Work Specified Elsewhere

1. Section 02316 – Select Granular Materials
2. Section 02317 – Rock Excavation
3. Section 02351 – Excavation, Backfill, and Trenching
4. Section 02900 – Restoration
5. Section 15106 – Ductile Iron Pipe, Fittings and Accessories
6. Section 15110 – Valves and Appurtenances
7. Section 15140 – Testing and Disinfection
8. Section 15170 – Plumbing Piping

1.2 QUALITY ASSURANCE

A. Reference Standards

1. AWWA Standards identified in other related sections.
2. ASTM Standards identified in other related sections.
3. ANSI Standards identified in other related sections.
4. Occupational Safety and Health Administration (OSHA).
5. 1996 Safe Drinking Water Act.
6. NSF/ANSI Standard 60 and 61, as applicable.
7. All other standards itemized in related work sections.

1.3 SUBMITTALS

A. Shop Drawings

1. Prior to obtaining any products in relationship to this Section, the CONTRACTOR shall submit detailed Shop Drawings and data for review by the ENGINEER.

B. Materials List

2. The CONTRACTOR shall submit, along with shop drawings, a materials list, which shall include full information regarding all components of the watermain. Materials of construction shall be presented in the listing.

C. Other Submittals

1. Prior to installation of the proposed watermain, the CONTRACTOR shall furnish the required number of the manufacturer's Operation and Maintenance Manual for each item.

2. The CONTRACTOR shall submit certificates of compliance with the applicable referenced standards.

3. A tabulated layout schedule.

4. Detailed procedure, schedules and list of materials for interconnection sequence.

5. Furnish delivery tickets indicating the pipe manufacturer, pipe type and class, identifying that the pipe was new and from a manufacturer that has been submitted and approved.

D. Certificate

1. Submit certificate of compliance with NSF/ANSI Standard 61 for all products under this section, including interior coatings, by an independent, authorized laboratory.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. During delivery and handling, all materials shall be braced and protected from any distortion or damage in accordance with the manufacturer's requirements; any such distortion or damage shall be basis for rejection of the materials.

B. Equipment used for unloading shall be covered with wood or rubber to avoid damage to the exterior of the pipe, fittings and accessories. Do not drop or roll materials off trucks.

C. The materials shall be inspected before and after unloading. Materials that are found to be cracked, chipped, gouged, dented, or otherwise damaged shall not be accepted.

D. Interiors of pipe, fittings and specials shall be kept free from dirt and foreign matter.

E. Store pipe and fittings on heavy wood blocking or platforms so they are not in contact with the ground.

F. Pipe, fittings, and specials shall be unloaded opposite to or as close to the place where they are to be used as is practical to avoid unnecessary handling.

PART 2 PRODUCTS

2.1 MATERIALS

A. General

1. All products, including interior coatings, shall be suitable for use in a potable water system.

2. All products, including wetted parts, shall be certified to meet NSF/ANSI Standard 61.

B. Pipe

1. Materials for the piping, joints and fittings shall be as specified in other related sections or as shown in the pipe schedule or on the Contract Drawings.

2. Pipe and appurtenances shall comply with the applicable standards for its type of material.

3. All pipes, fittings, valves, hydrants, specials, and accessories must be new materials in first-class condition. Used or recycled materials shall not be allowed, regardless of condition.

4. Piping for hydrant branches shall only be Class 53 ductile iron.

5. Piping within casing pipes (except for tree bores) and beneath pavement shall be ductile iron pipe as shown and as specified.

6. Piping in non-paved areas shall be either ductile iron pipe, pre-stressed concrete cylinder pipe, or PVC as shown and as specified.

C. Joints

1. Type of joints shall be as specified in other related Sections or as shown in the pipe schedule or as on the Contract Drawings.

D. Magnetic Pipe Marking Tape

1. Magnetic pipe marking tape as manufactured by C.H. Hanson Products, Paul Potter Warning Tape, or approved equal shall be installed above all new watermain.

2. Tape shall be 3 inches wide consisting of two (2) exterior plies of polyethylene with an aluminum alloy foil core.

3. Tape shall be blue color and labeled “WATER" in black letters.

PART 3 EXECUTION

3.1 INSTALLATION

A. General

1. Excavation and backfilling shall be in accordance with the applicable provisions of Section 02351 - Excavation, Backfill, and Trenching.

2. Blocking will not be permitted under pipe, except where the pipe is to be laid with concrete cradle or encasement.

3. Pipe shall be installed on a layer of select material as shown on the Drawings to provide an acceptable bedding. The top of this layer shall then be considered the bottom of the trench.

4. Pipe shall not be laid on bedrock without appropriate bedding stone.

5. No pipe shall be laid upon a foundation in which frost exists or when there is danger of the formation of ice or the penetration of frost at the bottom of the excavation.

6. Bell holes shall be dug in the bottom of the trench to allow the pipe to have a firm bedding along the entire length of the pipe.

7. Temporary watertight bulkheads shall be placed in all open ends of pipe whenever pipe laying is not actively in process. The bulkheads shall be designed to prevent the entrance of dirt, debris, or water.

8. Precautions shall be taken to prevent the flotation of pipe in the event of water entering the trench.

9. Hydrant installation shall be as specified in Section 02080 - Fire Hydrants and as specified herein.

B. Location and Grade

1. Watermain and appurtenances shall be located as shown on the Contract Drawings or as directed and as established from the control survey in accordance with the General Requirements.

2. The alignment and grades shall be determined and maintained by a method acceptable to the ENGINEER.

3. Pipe shall be installed in straight horizontal trenches. "Snaking" of pipe by bending sections horizontally shall not be allowed.

C. Subgrade

1. The subgrade for pipelines shall be earth or bedding as specified or directed and shall be installed in accordance with Section 02351 - Excavation, Backfill, and Trenching.

D. Joints

1. Joints shall be assembled using gaskets, lubricants and solvents as furnished by the pipe manufacturer and in accordance with the manufacturer's recommendations.

2. Joint deflection shall not exceed 50 percent of manufacturer's recommendations.

E. Bedding

1. Bedding shall be deposited and compacted in accordance with Section 02351 - Excavation, Backfill, and Trenching, and shall be as itemized below unless otherwise specified or directed.

2. For watermains:

a. The bedding shall be as specified in Section 02316, Select Granular Materials.

b. Bedding shall be deposited and tamped in 6-inch layers to the centerline of the pipe or to 6 inches above the pipe in paved or traveled areas.

c. Native material placed above the centerline of the pipe shall be deposited in such a manner as to not damage the pipe. Native material shall be suitable for backfill above the centerline of the pipe provided the materials are 2 inches in size or less. Native materials shall be suitable for backfill 6 inches above the pipe in non-paved areas provided the materials are 2 to 4 inches in size, but bedding is required to 6 inches above the pipe. Native materials greater than 4 inches are unacceptable for backfill.

F. Thrust Restraints

1. Thrust restraints for watermains shall be accomplished by the use of both thrust blocks and mechanical restraints for sizes through 12 inches. Joints for watermains 16 inches and larger shall have thrust restraints provided by harnessed joints only. Restraints shall be in the form of retainer glands; ductile iron locking segments with spigot weldment; or anchors of the size and type specified or as required by the pressure and stability of the supporting surface.

2. Thrust restraints shall be installed at all changes in direction, changes in size, dead ends or other locations where shown or directed.

3. Valves shall be treated as a bulkhead condition and pipe joints shall be restrained on both sides of the valve.

4. Cast in place concrete used for thrust restraints shall have developed the required strength prior to testing of the watermain.

5. When approved for use by ENGINEER, tie rods and nuts for thrust restraints shall be of high tensile steel and shall have a minimum yield strength of 70,000 psi.

   a. Tie rods and nuts installed underground shall be coated with two coats of coal tar pitch preservative coating after installation.

   b. Oil, grease, paint, or any coating, which requires drying, will not be acceptable.

6. All fire hydrant branches from the mainline tee to and including valve and hydrant shall be restrained.

7. All piping installed for interconnections shall be restrained.

8. All piping installed within casing pipes shall be restrained for the full length of the pipe installed within the casing pipe.

9. All piping installed within the limits of creek crossings shall be restrained for the full length of the creek crossing limits.

G. Concrete Thrust Blocks

1. Solid concrete blocks shall be used for proper blocking. Hollow concrete blocks or wooden blocking is not acceptable. Cast-in-place wet concrete mix shall be used for vertical bends and anchor collars.

H. Magnetic Pipe Marker

1. Magnetic pipe marker tape shall be placed above all new watermains as shown on the Drawings.

2. Magnetic pipe marker tape shall be tied to watermain valve boxes.

3. Splices, where needed, shall be made in accordance with manufacturer's recommendations.

4. At completion of the Project and before final payment is made, the CONTRACTOR shall test the entire length of the pipe using pipe locating equipment. Tests shall be made only in the presence of the ENGINEER. Any section of tape not continuous or that is undetectable shall be removed and replaced at the CONTRACTOR's expense.

3.2 CUTTING AND SPECIAL HANDLING

A. Field cuts of pipes shall be in accordance with the manufacturer's instructions.

B. Where a pipe requires special handling or installation it shall be in accordance with the applicable referenced standard.

3.3 INTERCONNECTIONS

A. Perform interconnections as shown on the Contract Drawings and in accordance with Section 01731, Connections to Existing Facilities.

3.4 TESTING

A. General

1. Performance testing, leakage, hydrostatic, and proof-of-design tests shall be as specified in Section 15140 - Testing and Disinfection.

B. Testing Criteria

1. Perform pressure testing to the criteria listed in the table as shown on the Drawings.

C. Ultrasonic Joint Testing.

1. Each joint shall, at the CONTRACTOR’s sole cost and expense, be tested with ultrasonic test equipment prior to being backfilled. If a leak is detected, corrective action shall be taken prior to installing the next pipe.

2. The fact that a point (or joints) has passed the ultrasonic testing does not wave the requirements for the hydrostatic tests described in Section 15140.

3. The testing equipment shall be manufactured by Moffat Enterprises of Powell Butte, or equal.

3.5 DISINFECTION

A. All watermains and piping shall be tested and disinfected in accordance with Section 15140 - Testing and Disinfection.

3.6 GENERAL

A. Install watermain, fittings, and accessories in accordance with applicable sections; as shown on the Drawings; and, as specified, required, or directed.

B. Tapping Watermain.

1. Wet tap connections to existing watermains shall be as shown on the Drawings.

2. The person or firm who will be performing the watermain tap shall be acceptable to the AUTHORITY.

3. Prior to ordering the tapping sleeve, the CONTRACTOR shall excavate a test pit to the depth required and expose the main to be taped to accurately measure the outside diameter of the main. No tapping sleeve shall be ordered until this information has been obtained.

4. Tapping sleeves shall be suitable for use with the existing pipe to be tapped. Tapping sleeve shall be compatible with the tapping valve furnished.

5. Thrust blocks shall be constructed behind the wet tap connection as shown on the Drawings and specified herein.

6. Refer to Section 15140 for additional requirements for tapping sleeve and valve testing.

7. After each tap has been completed, the CONTRACTOR shall keep the tapping area uncovered for a minimum period of one (1) hour to determine if any leakage is occurring. If any leakage has occurred, the tap shall be made watertight in a manner approved by the ENGINEER.

8. A full pipe coupon shall be retained as a result of the tapping operation.

9. The valves shall be kept closed until approval from the ENGINEER is given to open the valve.

C. Discrepancies

1. If discrepancies occur between the Drawings and field conditions, the CONTRACTOR shall notify the ENGINEER immediately.

2. The CONTRACTOR shall not proceed with the installation in areas of discrepancy until said discrepancy is resolved.

END OF SECTION

SECTION 15052

EXPOSED PIPING INSTALLATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. All types and sizes of exposed piping. These include, but are not limited to: steel, copper, and polyvinyl chloride.

B. Piping embedded in concrete within a structure or foundation will be considered as exposed and included herein.

C. Restraints, supports, thrust blocks and kickers.

D. Work on existing pipelines.

E. Testing, cleaning, and disinfection.

F. Joints, specials, couplings, flexible couplings, mechanical couplings, adapters, harnessed and flanged adapters, sleeves, tie rods, jointing and gasketing materials, closures, and end caps.

G. All valves and specials shown or specified shall be incorporated into the piping systems as required and as specified in Section 15110.

H. All bolts, nuts and gaskets required for installation of piping systems.

1.2 RELATED SECTIONS

A. Section 09900 - Painting

B. Division 15 - Mechanical

1.3 REFERENCES

A. Comply with applicable provisions and recommendations of the following, except as otherwise specified.

1. ASTM A53, Welded and Seamless Steel Pipe.

2. ANSI B13.1, Code for Pressure Piping.

3. AWWA C206, Field Welding of Steel Water Pipe Joints.

4. AWS, D1.1, Structural Welding Code.

5. AWS, D10.9, Standard for Qualification of Welding Procedures and Welders for Piping and Tubing.

6. ASTM D 2467, Socket-Type Polyvinyl Chloride (PVC).

7. ASTM D 2564, Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings.

8. ASTM D 2855, Making Solvent-Cemented Joints with Polyvinyl Chloride (PVC) Pipe and Fittings.

9. AWWA 6207, Steel Pipe Flanges for Waterworks Service.

1.4 QUALITY ASSURANCE

A. Welding Materials and Procedures: Conform to applicable AWS Code.

1.5 SUBMITTALS

A. Shop Drawings: Submit the following for approval in accordance with the Special Conditions of these specifications:

1. Laying schedules and detailed layout drawings for all piping. The layout drawings shall be prepared to scale with reference to stationing and elevations shown on the Contract Drawings. Each piece of pipe, fitting or special shall be designated on the layout drawing and in the schedules. Pipe, fittings and specials delivered to the job Site shall be marked with the same letter or number designation appearing on the layout drawings and in the schedules.

2. Full details of piping, specials, supports and connections to existing pipes and structures.

3. Typical joint and harnessing details.

B. Tests: Submit description of proposed testing methods, procedures and apparatus. Submit copies of all test reports.

C. Certificates: Submit certificates of compliance with referenced standards.

D. Record actual locations of valves, flow meters, and other flow control devices as well as any other deviations from the Contract Documents such as routing or elevation.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing the work of this section with a minimum of three (3) years' experience.

1.7 REGULATORY REQUIREMENTS

A. Comply with the applicable provisions of the following regulatory agencies:

1. Building Officials and Code Administrators (BOCA)

2. Applicable local building codes

3. Underwriters Laboratories, Inc.

4. State and Local Plumbing Codes

5. Other authorities having jurisdiction

PART 2 PRODUCTS

2.1 MATERIALS

A. Pipe materials required are shown on the Contract Drawings and are specified in the applicable Division 15 Specifications. Refer to applicable sections for detailed material specifications.

PART 3 EXECUTION

3.1 EXAMINATION

A. All pipes shall be carefully inspected prior to installation.

B. The CONTRACTOR is responsible for assuring that damaged pipe is not used. Defective pipe shall be removed from the Site.

C. Any pipe found to be broken or defective after it has been installed shall be removed and replaced at the CONTRACTOR'S expense. Pipe, fittings and accessories that are cracked, damaged or in poor condition or with damaged linings will be rejected.

D. If there is a question regarding the quality of any pipe or fittings delivered to the Site, the CONTRACTOR will supply to the ENGINEER a certified letter from the pipe vendor stating that the pipe meets all conditions of the Specifications. If certified letter cannot be supplied, questionable material will be replaced at the CONTRACTOR'S expense.

E. Request instructions from the ENGINEER when there is a conflict between existing piping systems and equipment and proposed piping to be installed.

3.2 PREPARATION

A. Lines and Elevations:

1. Accurately install pipe to the lines and elevations as shown on the Contract Drawings.

2. Install pipe on a straight sight line and elevations.

3. Any section of pipe found to be installed at the wrong elevation or alignment shall be re-installed to the satisfaction of the ENGINEER at the CONTRACTOR'S expense.

4. The CONTRACTOR is responsible for maintaining lines and elevations.

B. Pipe:

1. Clean pipe thoroughly.

2. Apply lubricant in accordance with the manufacturer’s written instructions.

3. Insert the gasket and seal it, if required, in accordance with manufacturer's written directions.

4. Field cutting of pipe, if necessary, shall leave a smooth end and be performed in accordance with the manufacturer's written instructions.

3.3 INSTALLATION

A. General:

1. Request instructions from ENGINEER before proceeding if there is a conflict between the manufacturer's recommendations and the Contract Drawings.

2. Present conflicts between piping systems and equipment or structures to ENGINEER for determination of corrective measures before proceeding.

3. Installation of all piping, fittings, valves, specials and appurtenances shall be subject to the approval of the ENGINEER.

4. Field Measurements: Take field measurements where required prior to installation to ensure proper fitting of work. Flanged piping shall be shop-fabricated in spooled sections. The use of flanged adapters shall be minimized.

5. Where unforeseen conditions will not permit the installation of piping as shown or specified, no piping shall be installed without approval of the ENGINEER. Do not modify structures without approval of the ENGINEER.

6. All field painting and insulation work specified under other sections of the Specification shall only be conducted after all joints are made, the system has been cleaned or flushed as specified, the system has been pressure tested, and the ENGINEER approves the commencement on such work.

B. Piping:

1. Prior to installing pipe, every precaution shall be taken to ensure that no foreign material enters the pipe.

2. All pipe, fittings, valves and accessories shall be carefully examined for cracks, damage or other defects before installation. Defective materials shall be immediately removed from Site. Any pipe, fitting, valve or accessory found to be broken or defective after it has been installed shall be removed and replaced at the CONTRACTOR's expense.

3. Thoroughly clean all pipe, fittings, valves and accessories before installing.

4. Interior of all pipes, fittings, valves and accessories shall be inspected and all dirt, debris or other foreign material shall be completely removed from pipe interior before it is installed. Measures shall be taken to maintain the interior of all pipe clean until acceptance of the completed work.

5. Install straight runs true to line and elevation.

6. Install vertical pipe truly plumb in all directions.

7. Install piping parallel or perpendicular to structure walls, floors and ceilings and supported therefrom. Piping at odd angles and 45 degree runs across corners will not be accepted unless specifically shown or approved.

8. Install small diameter piping generally as shown on the Contract Drawings when specific locations and elevations are not otherwise indicated. Locate such piping as required to avoid ducts, equipment, beams, etc.

9. Install piping so as to leave all corridors, walkways, work areas and like spaces unobstructed. Unless otherwise approved, provide a minimum headroom clearance under all piping of 6 feet 8 inches.

10. Provide temporary caps or plugs over all pipe openings at the end of each days work, or when otherwise required or directed unless otherwise approved by ENGINEER.

11. Install piping through walls and floors using standard weight galvanized pipe sleeves or wall fittings, unless otherwise shown on the Contract Drawings or directed by the ENGINEER.

12. Seal annular space between pipe sleeve and pipe on each concrete face with an approved mechanical sealing device such as Link-Seal, as manufactured by the Thunderline Corporation, or equal.

13. Where small diameter piping is to be connected to large diameter pipe and tapping is required or specified, provide taps in accordance with the pipe manufacturer's recommendations and requirements, unless otherwise shown or specified.

14. Flanged or threaded joints shall be used at all equipment and valve connections, unless otherwise shown on the Contract Drawings, specified in these Specifications or directed by the ENGINEER. Threaded connection shall be equipped with a union to accommodate maintenance and removal.

15. Unless otherwise shown on the Contract Drawings or specified herein, install a shutoff valve constructed of materials suitable for the intended service on every lateral and pipe connection to equipment, except drain and vent lines.

16. Pipe with outlets shall be rotated as required to place outlets in proper position.

17. Care shall be taken not to leave tool marks or abrasions on plated, polished or soft metal piping.

C. Joints:

1. General:

   a. Make joints in accordance with the pipe manufacturer's recommendations and the Specifications below.

   b. Cutting: Cut pipe from measurements taken at Site, not from Contract Drawings.

   c. Field cut metallic pipe, where required for inserting valves, fittings and closures with a machine specially designed for cutting piping and in accordance with the manufacturer's instructions.

   d. Cut piping accurately and squarely without damage to pipe or lining, so as to leave a smooth end at right angles to pipe axis. Install without forcing or springing.

   e. Ream out all pipes and tubing to full inside diameter after cutting. Taper cut ends and removes all sharp edges on end cuts.

   f. Remove all cuttings and foreign matter from the inside of pipes and tubing before installation.

   g. Pipe damaged by the CONTRACTOR by improper or careless methods of cutting shall be replaced at his expense.

2. Threaded Joints: Use standard National pipe threads, right-hand tapered full depth threads on steel piping and apply an approved joint compound to the male threads only, before installation. Leave not more than three (3) pipe threads exposed at each connection.

3. Flanged Joints:

   a. Assemble flanged joints with approved full-faced gaskets and gasket compounds. Gaskets shall be suitable for service intended in accordance with manufacturer's ratings and instructions.

   b. Draw up flange bolts evenly until joint is perfectly tight.

   c. Length of bolts shall be uniform and they shall not project from the nut more than 1/4-inch or fall short of the end of the nut when fully taken up.

   d. Ends of bolts shall be cut off in a lathe so as to be neatly rounded. No washers shall be used.

   e. Clean and lubricate bolt threads and gasket faces for flanged joints.

4. Copper Tubing Joints:

   a. Assemble copper tubing with soldered joints, solder shall be 95-5 tin-antimony.

   b. Ream or file pipe to remove burrs.

   c. Clean and polish contact surfaces of joints.

   d. Apply flux to both male and female ends.

   e. Insert end of tube into fittings full depth of socket.

   f. Heat joint evenly.

   g. Form continuous solder bead around entire circumference of joint.

5. Thermoplastic Pipe Joints:

   a. Solvent Cement Joints:

      1) Bevel the pipe end and remove all burrs before making joint. Clean both pipe and fittings thoroughly. Do not attempt to make solvent cement joints if temperature is below 40 degrees F nor in wet conditions.

      2) Apply a complete coating of primer to the outside surface of the pipe end and to the mating inside surface of the socket. Apply a liberal coat of solvent cement to the pipe socket. Immediately after application of cement, insert the pipe to the full depth of the socket while rotating the pipe fitting 1/4 turn to evenly spread the cement. Hold joint together for a minimum of 10 to 15 seconds to ensure pipe does not back out of socket. Immediately after joining, wipe all excess cement from the pipe and fittings leaving only a small bead of cement around the circumference of the joint. The joint shall be allowed to set for a minimum of one-half hour before handling.

      3) Due to the explosive hazard, the following safety precautions shall be observed in conjunction with the use of solvent weld plastic pipe:

         a) Air shall be permitted to circulate through the pipeline to permit solvent vapor to escape.

         b) When flushing or filling pipelines, admit water slowly to prevent compression of the gases within pipe.

b. Threaded Joints:

1) Cut pipe square and smooth and remove burrs or raised edges with a knife or file. Hold pipe firmly in a pipe vise. Protect pipe at the point of grip by inserting a rubber sheet or other material between the pipe and vise. Thread pipe in accordance with the pipe manufacturer's recommendations. Brush threads clean of chips and ribbons. Then starting with the second full thread, and continuing over the thread length, wrap TFE (Teflon) thread tape in the direction of the treads. Overlap each wrap by one-half the width of the tape. Screw the fitting or coupling onto the pipe and tighten by hand. Using a strap wrench only, further tighten the connection an additional one to two threads past tightness.

6. Flexible Coupling Joints:

a. Installation and assembly of couplings shall conform to the coupling manufacturer's recommendations.

b. Prior to assembly, the last 8 inches of the outside of each pipe end shall be cleaned thoroughly with a wire brush to remove foreign matter.

c. Following cleaning, lubricant shall be applied to each joint end. Lubricant shall be NSF approved in potable water applications.

d. Immediately after application of the lubricant, the coupling shall be slipped over each pipe end.

e. All bolts shall be inserted and all nuts screwed up tightly with a wrench in accordance with the coupling manufacturer's recommendations.

f. Nuts spaced 180 degrees apart shall be tightened alternatively in order to produce an equal pressure on all parts of the coupling.

7. Unions:

a. Install all threaded pipelines with frequently placed unions to permit easy disassembly where applicable.

b. Install dielectric unions wherever dissimilar metals are connected except for bronze or brass valves in ferrous piping.

c. Provide a union downstream of each valve with screwed connections.

d. Provide unions at each piece of equipment, where shown, and where necessary to install or dismantle piping.

D. Valves and Accessories:

1. Provide supports for large valves and other heavy items as shown.

2. Install floor stands as shown and as recommended by the manufacturer.

3. Provide lateral restraints for extension bonnets and extension stems as shown and as recommended by the manufacturer.

4. Install valve operators as shown. When the position is not shown, install the valve so that it can be conveniently operated (generally approximately 4 feet above surrounding floor) and as approved by ENGINEER. Avoid placing operators at angles to the floors or walls. If it is not practical to position the valve in an accessible location, actuator extensions shall be provided to do so.

E. Transitions from One Type of Pipe to Another:

1. Provide all necessary adapters, specials and connection pieces required when connecting different types and sizes of pipe or connecting pipe made by different manufacturers.

2. Wherever changes in sizes of piping occur, changes shall be made with reducing fittings. The use of bushings is not permitted unless otherwise shown.

F. Restraints, Supports and Thrust Blocks:

1. Install restrained joints as shown, specified, required and as recommended by manufacturer.

2. Provide concrete and metal cradles, collars, kickers and blocks as shown or otherwise approved by ENGINEER.

3. Provide restraints, supports, collar and blocks of sufficient size and weight to prevent expansion and contraction forces from reaching valves, pumps or equipment.

4. All joints on the steel and copper pipe shall be restrained to provide for thrust protection along the entire length of each pipe, fitting and special including connections to valves, equipment and wall fittings.

3.4 HYDROSTATIC TEST AND DISINFECTION OF PIPING

A. Scope of cleaning, testing, and disinfection of all piping shall be as defined in Section 01010, Summary of Work, and shall be carried out as specified in Section 15140, Testing and Disinfection, unless otherwise specified.

END OF SECTION

SECTION 15063

STEEL PIPE AND FITTINGS

PART 1 GENERAL

1.1 DESCRIPTION

A. This section defines the minimum requirements for the materials, construction and dimensions of steel pipe and fittings.

B. Related Sections

1. Section 09900 – Painting
2. Section 15052 – Exposed Piping Installation
3. Section 15110 – Valves And Appurtenances
4. Section 15140 – Testing And Disinfection
5. Section 15150 – Pipe Hangers And Supports
6. Section 15260 – Piping Insulation

1.2 REFERENCES

A. ANSI/AWS D1.1, Structural Welding Code- Steel

B. ANSI/AWS B2.1, Specification for Welding Procedure and Performance Qualification

C. ANSI/AWWA C200, Steel Water Pipe—6 In. (150 mm) and Larger

D. ANSI/AWWA C206, Field Welding of Steel Water Pipe

E. ANSI/AWWA C207, Steel Pipe Flanges for Waterworks Service—Sizes 4 inches through 144 inches (100 mm through 3,600 mm)

F. ANSI/AWWA C208, Dimensions for Fabricated Steel Water Pipe Fittings

G. ANSI/AWWA C216, Heat-Shrinkable Cross-Linked Polyolefin Coatings for the Exterior of Special Sections, Connections, and Fitting

H. ANSI/AWWA C219, Bolted, Sleeve-Type Couplings for Plain-End Pipe

I. ANSI/AWWA C222, Polyurethane Coatings for the Interior and Exterior of Steel Water Pipe and Fittings

J. ASME Section IX, International Boiler & Pressure Vessel Code: Welding and Brazing Qualifications

K. AWWA M11, Steel Water Pipe: A Guide for Design and Installation

1.3 QUALITY ASSURANCE

A. Manufacturers fully experienced, reputable, and qualified in the manufacture of the products to be furnished shall furnish all steel pipe and fittings. The pipe and fittings shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with these Specifications as applicable.

B. Pipe cylinders, lining, coating and fabrication of specials shall be the product of one manufacturer that has not less than five (5) years successful experience manufacturing pipe of the particular type and size indicated. The pipe manufacturer must have a certified quality assurance program. This certified program shall be ISO 9001:2000 or other equivalent nationally recognized program as approved by the ENGINEER.

1.4 SUBMITTALS

A. Shop Drawings - Drawings shall be submitted to the ENGINEER for approval and shall include the following:

1. Pipeline layout and laying schedule showing stations, elevations, locations of bends, fittings, closure pieces, specials and adapters.

2. Details of standard pipe, joints, specials, and fittings.

3. Manufacturers recommendations for welding pipe joints.

4. Manufacturers recommendations for repair of coatings and linings after installation and welding of joints.

B. Design

1. Calculations for pipe design and fittings reinforcement and/or test data.

2. Details of joint bonding and field welded joint restraint calculations.

C. Certifications

1. The CONTRACTOR shall furnish a certified affidavit of compliance that meets or exceeds the requirements of these specifications for all pipe and fittings furnished.

2. Linings for potable piping shall be NSF certified.

1.5 VERIFICATION

A. Inspections

1. All pipe shall be subject to inspection at the place of manufacture in accordance with the provisions of AWWA C200 and AWWA coating and lining standard as supplemented by the requirements herein.

B. Tests

1. Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of AWWA C200 and AWWA coating and lining standards.

2. The CONTRACTOR shall perform required tests at no additional cost to the OWNER. The ENGINEER shall have the right to witness all testing conducted by the CONTRACTOR, provided that the CONTRACTOR’s schedule is not delayed for the convenience of the ENGINEER.

C. Welding Requirements

1. All welding procedures used to fabricate pipe shall be qualified under the provision of AWS B2.1 or ASME Section IX.

D. Welder Qualifications

1. Skilled welders, welding operators, and tackers who have had adequate experience in the methods and materials to be used shall do all welding. Welders shall maintain current qualifications under the provisions of AWS B2.1 or ASME Section IX. Machines and electrodes similar to those in the work shall be used in qualification tests. The CONTRACTOR shall furnish all material and bear the expense of qualifying welders.

1.6 HANDLING, STORAGE, AND SHIPPING

A. Pipe shall be stulled as required to maintain roundness of plus or minus one (1) percent during shipping and handling.

B. Coated pipe shall be shipped on padded bunks with nylon belt tie-down straps or padded banding located approximately over stulling.

C. Coated pipe shall be stored on padded skids, sandbags other suitable means so that coating will not be damaged.

D. Coated pipe shall be handled with wide belt slings. Chains, cables or other equipment likely to cause damage to the pipe or coating shall not be used.

E. Prior to shipment, dialectically coated pipe shall be visually inspected for damage to the coating by the following procedure:

1. When visual inspection shows a dielectric coating system has sustained physical damage, the area in question shall be subjected to an electrical holiday test. Exterior tape coatings shall be voltage tested AWWA C214. Interior polyurethane coatings shall be voltage tested per AWWA C222.

2. When the damaged area does show damage going clear to the steel from either a visual inspection or a jeep from a holiday detector, the area shall be repaired in accordance with Section 2.2 of these specifications and per manufacturer's recommendations.

1.7 MARKINGS

A. The CONTRACTOR shall legibly mark all pipes and specials in accordance with the laying schedule and marking diagram. Each pipe shall be numbered in sequence and said number shall appear on the laying schedule and marking diagram in its proper location for installation. All special pipe sections and fittings shall be marked at each end with top field centerline. The word "top" or other suitable markings shall be painted or marked on the outside top spigot end of each pipe section.

PART 2 PRODUCTS

2.1 STEEL PIPE

A. Steel pipe shall conform to AWWA C200 and be manufactured using methods provided for in the AWWA C200 Standard. Steel plate used in the manufacture and fabrication of steel pipe shall meet the requirements of AWWA C200. All longitudinal and girth seams, whether straight or spiral, shall be butt-welded using an

approved electric-fusion-weld process. All connections to new or existing pipe and equipment shall be flanged where indicated on the contract drawings.

B. The steel used to manufacture the steel pipe and fittings shall have a minimum yield strength of 36,000 psi. Conforming to ASTM A139 Grade C, ASTM A1018 Grade 40, ASTM A570 Grade 36, or ASTM A36 as specified in AWWA C200 specifications. Minimum wall thickness shall be 0.25 inches.

C. Pipe shall be designed for a minimum 200 psi working pressure with an additional 100 psi allowance for surge, in accordance with AWWA M11.

D. Pipe shall be installed per the Plan details or manufacturer's recommendations.

E. Pipe is to be furnished principally in 5-feet lengths or greater with shorter lengths, field trim pieces, and closure pieces as required by Plan and profile for location of elbows, tees, reducers and other in-line fittings or as required for construction. The pipe fabricator shall prepare a pipe laying schedule showing the location of each piece by mark number with station and invert elevation at each bell end.

F. MANUFACTURER

1. Northwest Pipe Company.

2. Mid-America Pipe.

3. Or equal.

2.2 FITTINGS

A. Unless otherwise shown on the Plans, all specials and fittings shall conform to the dimensions of AWWA C208. Pipe material used in fittings shall be of the same material and pressure class as the adjoining pipe. The minimum radius of elbows shall be 2½ times the pipe diameter and the maximum miter angle on each section of the elbow shall not exceed 11¼ degrees (one cut elbow up to 22½ degrees). If elbow radius is less than 2½ times the pipe diameter, stresses shall be checked per AWWA M11 and the pressure class increased if necessary.

B. Fittings shall be equal in pressure class design as the adjoining pipe. Specials and fittings, unless otherwise shown on the Plans, shall be made of segmentally welded sections from hydrostatically tested pipe, with ends compatible with the type of joint or coupling specified for the pipe. All welds made after hydrostatic testing of the straight sections of pipe shall be tested per the requirements of AWWA C200 Section 5.2.2.1.

2.3 JOINTS

A. Lap Weld

1. The standard joint shall be a lap welded restrained joint unless otherwise noted on the Plans. Lap weld joints shall conform to AWWA C200 and as shown in Chapter 8 of AWWA M11.

2. The standard bell shall be formed by expanding with dies on a hydraulic expander, or by rolling. After forming, the minimum radius of the curvature of the bell end at any point shall not be less than fifteen (15) times the nominal thickness of the steel shell.

3. Joints shall permit a lap, when the joint is assembled of at least 1-inch.

4. Lap welded joints shall be welded either externally or internally. Holdbacks for coating and linings shall be provided as shown on the approved Shop Drawings. Size, type and methods for joint

welding shall be as recommended by the manufacturer for the pressures and design conditions listed in this section of the Specifications. Details, procedure and methods of joint welding shall be submitted for approval along with the Shop Drawings.

B. Flanges

1. Joints shall have a flanged connection as indicated on the Contract Drawings or where recommended by the manufacturer.

2. Flanges shall be AWWA C207 Class E for operating pressures over 150 psi to 275 psi.

3. Shop lining and coating shall be continuous to the end of the pipe or back of the flange. Flange faces shall be shop coated with a soluble rust preventive compound.

4. Gaskets shall be full face, 1/8-inch thick, cloth-inserted rubber, Garlock 3000, John Crane Co. Style 777 or equal.

5. Where a flanged joint falls within a cathodically protected section of pipe a bonding jumper shall be installed across the joint using bonding wire attached to pipe by cap weld as shown in the details.

C. Restrained Flanged Adapter

1. Restraint shall be accomplished by use of a gland that incorporates wedges that increase their resistance to pull out as pressure or external forces increase.

2. The restrained flange adapter shall be comprised of two rings made of ductile iron conforming to ASTM A536.

3. The restraining ring shall be suitable for flanges conforming to AWWA C115 flange drilling.

4. Nuts and bolts shall be fluorocarbon coated or Type 304 stainless steel, high strength, low alloy.

5. Torque limiting twist off nuts shall be used to insure the proper actuation of the wedges. When the nut is sheared off, a standard hex head shall remain.

6. Provide fusion bonded epoxy coating on the gasket ring and shop primer on the body.

7. Restrained flange adapter shall be suitable for use on ductile iron pipe.

8. Manufacturer

   a. EBAA Iron, Series 2100 Megaflange.

   b. Or approved equal.

D. Bolts and Nuts for Flanges

1. Bolts and nuts for flanged joints shall be stainless steel, Type 304. Include stainless steel washers. All bolts and nuts shall have hexagon heads. Bolts shall not protrude more than ¼-inch from, nor short of the end of the nut.

2. All unwelded pipe joints shall be bonded for electrical continuity in accordance with the Pipe Manufacturer's recommendations unless otherwise specified in the Plans.

E. Pipe Expansion Joints

1. Rubber Pipe Expansion Joints shall be used on each pump to absorb pipe movements, relieve stress, reduce system noise and vibration, and protect equipment against startup surge forces.

2. Pipe Expansion Joints shall be installed directly to the flange on the suction side of each pump.

3. Pipe Expansion Joints shall be Filled-Arch type Expansion Joints and shall include control rods as recommended by the manufacturer.

4. Control Rods shall be constructed of Type 304 Stainless steel.

5. Manufacturer

a. Proco, Style FA231.

b. Holz Rubber, Series 320FA.

c. Or approved equal.

2.4 LININGS AND COATINGS

A. Epoxy Lining

1. Epoxy lining shall be per AWWA C210 to a minimum thickness of 20 mils. Lining shall be continuous to the ends of the pipe except where field welding is indicated.

2. Lining repair shall be per AWWA C210 and manufacturer's recommendations.

B. Exterior Coating

1. Steel process piping exterior shall be finished as indicated on the Contract Drawings. Pipe scheduled to be insulated shall be prepped, primed and then insulated as outlined in Section 15260. Outside process pipe coating shall not receive a finished paint coating when underneath piping insulation.

PART 3 EXECUTION

3.1 INSTALLATION

A. The CONTRACTOR shall furnish and install all required piping and accessories in accordance with the Contract Documents and manufacturer's recommendations. Pipe installation as specified in this section supplements the information included in AWWA M11 – Steel Pipe A Guide for Design and Installation.

B. Joints shown on process piping shall be flanged or welded as indicated on Contract Drawings unless directed otherwise by ENGINEER.

C. Joints Assembly

1. Lap Field Welded Joints

a. Clean exposed end of joint surfaces.

b. Provide a minimum overlap of 1-inch at any location around the joint circumference.

c. Field welders and field weld procedures shall be certified in accordance with AWS D1.1.

d. At the CONTRACTOR'S option, provide a full fillet weld per AWWA C206 either on the inside or outside of the pipe.

e. Testing of field welds shall be in accordance with AWWA C206.

f. Complete the interior of the joints with polyurethane per AWWA C222. Complete the exterior of the joints with heat-shrink sleeve per AWWA C216 and manufacturer's recommendations.

2. Flanged Joints

a. Bolt holes of flanges shall straddle the horizontal and vertical centerlines of the pipe. Clean flanges by wire brushing before installing flanged fittings. Clean flange bolts and nuts by wire brushing; lubricate bolts with graphite or oil.

b. Insert the nuts and bolts (or studs), finger tighten, and progressively tighten diametrically opposite bolts uniformly around the flange to the proper tension.

c. Execute care when tightening joints to prevent undue strain upon valves, pumps and other equipment.

d. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reset or replace the gasket, reinstall or re-tighten the bolts and nuts, and retest the joints.

3.2 FIELD QUALITY CONTROL

A. Pressure Tests of installed piping shall be as specified in section 15140 testing and disinfection.

3.3 PIPING SCHEDULE

Service	Pipe Materials	Fittings	Connections
Pump Station and Valve House Process Water Piping (Exposed)	Steel	Steel	Flange or welded as indicated on contract drawings.

END OF SECTION

SECTION 15106

DUCTILE IRON PIPE, FITTINGS, AND ACCESSORIES

PART 1 GENERAL

1.1 DESCRIPTION

A. Work Specified

The work specified shall include all labor, material, equipment, tools, services, and incidentals necessary to furnish and install ductile iron pipe, fittings, and appurtenances as shown, specified and required.

B. Pipe Schedule

1. 4-inch through 12-inch buried watermain (except hydrant piping):

a. Pipe class 52.

b. Non-restrained joints

1) Bell and spigot push-on joint pipe.

b. Restrained joints utilizing one of the following:

1) Mechanical joint pipe and fittings utilizing wedge action retainer glands.

2) Bell and spigot push-on joint pipe with ductile iron pipe wedge action restraining devices and mechanical joint fittings utilizing wedge action retainer glands.

3) Flexible restrained joint pipe and fittings utilizing patented ductile iron locking segment(s) or flex ring with factory applied spigot retainer weldment.

4) Flexible restrained joint pipe utilizing patented ductile iron locking segment(s) or flex ring with factory applied spigot retainer weldment and mechanical joint fittings utilizing wedge action retainer glands.

2. Flanged pipe watermain, all sizes:

a. Pipe Class 53.

b. Flanged joints are for non-buried applications.

C. Related Work Specified Elsewhere

1. Section 15051 – Buried Piping Installation

3. Section 15110 – Valves and Appurtenances

4. Section 15140 – Testing and Disinfection

1.2 QUALITY ASSURANCE

A. Manufacturer’s Qualifications

1. Manufacturer shall have a minimum of 5 years' experience producing ductile iron pipe, fittings and accessories, and shall show evidence of at least five installations in satisfactory operation.

2. Parts Interchangeability: It is the intent of these specifications that all materials furnished herein shall be compatible with similar materials of other manufacturers.

B. Reference Standards

1. AWWA C104, American National Standard for Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water

2. AWWA C105, American National Standard for Polyethylene Encasement for Ductile Iron Pipe Systems

3. AWWA C110, American National Standard for Ductile-Iron and Gray-Iron Fittings, 3-inch through 48-inch, (75 mm through 1200 mm), for Water and Other Liquids

4. AWWA C111, American National Standard for Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings

5. AWWA C115, American National Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges

6. AWWA C150, American National Standard for Thickness Design of Ductile-Iron Pipe

7. AWWA C151, American National Standard for Ductile Iron Pipe, Centrifugally Cast, for Water

8. AWWA C153, American National Standard for Ductile-Iron Compact Fittings. 3 in. through 24 in. (76 mm through 610 mm) and 54 in. through 64 in. (1400 mm through 1600 mm), for Water Service

9. ANSI B16.1, Cast Iron Pipe Flanges and Flanged Fittings

10. ANSI B1.20, Pipe, Threads, General Purpose (Inch)

11. ANSI B18.2.1, Square and Hex Bolts and Screws Inch Series, Including Hex Cap Screws and Lag Screws

12. ANSI B18.2.2, Square and Hex Nuts

13. ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

14. ASTM A354, Specification for Quenched and Tapered Alloy Steel Bolts, Studs and Other Externally Threaded Fasteners

15. ASTM A536 Standard Specification for Ductile Iron Castings

16. NSF/ANSI Standard 61

17. Underwriter’s Laboratories (UL)

18. International Organization for Standardization (ISO)

19. Factory Mutual Research Corporation

20. 1996 Safe Drinking Water Act

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Detailed drawings and data on pipe, fittings and accessories.

2. A materials list, which shall include full information regarding all components of the equipment. Materials of construction shall be presented in the listing.

B. Laying Schedules or drawings when requested or required or when custom pieces or specially marked pipe is used. Field closures and field cuts, and manner of restrained joints shall be shown.

C. Submit certificates of compliance with the applicable referenced standards.

D. Submit certificate of compliance with NSF/ANSI Standard 61 for all products under this section, including interior coatings, by an independent, authorized laboratory.

E. Furnish delivery tickets indicating the pipe manufacturer, pipe type and class, identifying that the pipe was new and from a manufacturer that has been submitted and approved.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. During delivery and handling, all materials shall be braced and protected from any distortion or damage; any such distortion or damage shall be basis for rejection of the materials.

B. Equipment used for unloading shall be covered with wood or rubber to avoid damage to the exterior of the pipe, fittings and accessories. Furthermore, all ductile iron pipe requiring polyethylene encasement as per Section 2.2.B, where the polyethylene has been field pre-applied to the pipe shall be handled with suitably padded equipment to prevent damage to the coating. Do not drop or roll materials off trucks. All ductile iron pipe and fittings shall be handled with padded slings or other appropriate equipment. The use of cables, hooks or chains will not be permitted.

C. The materials shall be inspected before and after unloading. Materials that are found to be cracked, gouged, chipped, dented or otherwise damaged will not be accepted.

D. Interiors of pipe, fittings and accessories shall be kept free from dirt and foreign matter.

E. Store pipe and fittings on heavy wood blocking or platforms so they are not in contact with the ground.

F. Pipe, fittings, and specials shall be unloaded opposite to or as close to the place where they are to be used as is practical to avoid unnecessary handling.

1.5 PIPE INSTALLATION SPECIALIST

A. A factory trained and certified manufacturer's pipe installation specialist shall be present during CONTRACTOR start-up and for a total of 5 working days when pipe laying is in progress and thereafter shall be available during the course of the project to assist the OWNER, ENGINEER, and/or CONTRACTOR when requested by the OWNER, ENGINEER, and/or CONTRACTOR. This field service shall be at no cost

to the OWNER. This can include field review of pipe/fittings when requested by the OWNER, ENGINEER, and/or CONTRACTOR.

B. The specialist shall submit three (3) copies of a written report to the ENGINEER presenting the findings of each visit. As a minimum, each report should include the following: date, day, time, purpose of the visit (and who initiated the visit), weather conditions, CONTRACTOR's name, project name and the contract number, ENGINEER's name, individuals contacted, location visited (station, street, field office, ENGINEER's main office OWNER's office, CONTRACTOR's office, etc.), and any other pertinent information related to the visit (such as the results of individual pipe/fitting inspections, etc.).

PART 2 PRODUCTS

2.1 MATERIALS

A. General

1. All products, including interior coatings shall be suitable for use in a potable water system.

2. All products, including wetted parts, shall be certified to meet NSF/ANSI Standard 61.

3. All ductile iron pipe, fittings and accessories shall be designed for a working pressure and field hydrostatic test pressure as shown in Section 15051, Buried Piping Installation.

4. All ductile iron pipe, fittings, and accessories must be new materials in first-class condition. Used or recycled materials shall not be allowed, regardless of condition.

5. All ductile iron pipe shall be provided from the same manufacturer.

6. Pipe shall be fully gauged.

7. Pipe shall be furnished in nominal laying lengths of 18 or 20 feet unless otherwise specified.

8. Pipe and fittings shall be lined with cement mortar lining in accordance with AWWA C104, except it shall be double thickness and a bituminous seal coat meeting NSF/ANSI Standard 61. The exterior shall be provided with a bituminous coating in accordance with AWWA C151. Fittings may be lined with an NSF/ANSI Standard 61 approved fusion bonded epoxy meeting the applicable sections of AWWA C116.

9. Bonded joints may be required in areas where the ENGINEER has evaluated soil conditions and has recommended that corrosion protection is required at locations as shown on the drawings. The pipe manufacturer shall supply all joint bonding materials, including #4 AWG stranded insulated copper wire bonding jumpers.

B. Ductile Iron Mechanical Joint Pipe and Fittings

1. Ductile Iron Mechanical Joint Pipe:

a. Pipe shall be centrifugally cast ductile iron conforming to the requirements of AWWA C151 for material, dimensions, tolerance, tests, markings and other requirements.

b. Manufacturer:

1) American Cast Iron Pipe Co.

2) Atlantic States, Inc.

3) Clow - A Division of McWane, Inc.

4) Griffin.

5) US Pipe.

2. Ductile Iron Mechanical Joint Fittings:

a. Tees, bends, elbows, reducers, increasers, offsets and other such fittings shall be mechanical joint ductile iron compact body conforming to AWWA C110 or AWWA C153, as specified.

b. Reducers shall be concentric or eccentric where specified.

c. Fittings shall be suitable for use with polyvinyl chloride pressure pipe.

d. Manufacturer:

1) American Cast Iron Pipe Co.

2) Clow - A Division of McWane, Inc.

3) Griffin.

4) Sigma Corp.

5) Star Pipe Products, Inc.

6) Tyler - A Division of McWane, Inc.

7) US Pipe.

3. Joints for Ductile Iron Mechanical Joint Pipe and Fittings:

a. Joints shall conform to AWWA C111 and shall be mechanical joint bell and spigot and be furnished complete with all necessary accessories consisting of ductile iron follower glands, plain tipped rubber gaskets, nuts and bolts, unless otherwise specified.

b. Fittings shall have mechanical joint ends and be furnished with all necessary joint accessories consisting of ductile iron follower glands, (or cast iron glands for cast iron fittings), plain tipped rubber gaskets, nuts and bolts, unless otherwise specified. Split follower glands shall be furnished and installed only when approved by the ENGINEER.

c. All nuts and tee bolts for mechanical joint accessories shall be fluorocarbon coated as specified herein.

4. Restrained Joints for Ductile Iron Mechanical Joint Pipe and Fittings:

a. Restrained joints for mechanical joint pipe and fittings shall be made by restraining the pipe on each side of the fitting for all joints along the length of pipe as shown, specified or required.

b. Restraining shall be accomplished at the mechanical joint fitting by use of a mechanical joint wedge action retainer that incorporates mechanical joint restraint into the design of the follower gland with individually actuated wedges that are tightened against the barrel of the pipe, as specified herein.

C. Push-On Ductile Iron Pipe and Fittings

1. Push-On Ductile Iron Pipe:

a. Pipe shall be centrifugally cast ductile iron conforming to the requirements of AWWA C151 for material, dimensions, tolerance, tests, markings and other requirements.

b. Manufacturer:

1) American Cast Iron Pipe Co.

2) Atlantic States, A Division of McWane, Inc.

3) Clow - A Division of McWane, Inc.

4) Griffin.

5) US Pipe.

2. Fittings:

a. Tees, bends, elbows, reducers, increasers, offsets and other such fittings shall be mechanical joint ductile iron compact body conforming to AWWA C110 or AWWA C153 and as specified herein.

3. Joints for Push-On Ductile Iron Pipe and Fittings:

a. Joints shall conform to AWWA C111 and shall be bell and spigot and be furnished complete with circular rubber gaskets, and other accessories as necessary for a complete installation.

b. Fittings shall have mechanical joint ends and be furnished with all necessary joint accessories consisting of ductile iron follower glands, (cast iron glands for cast iron fittings), plain tipped rubber gaskets, nuts and bolts, unless otherwise specified. Split follower glands shall be furnished and installed only when approved by the ENGINEER.

c. All nuts and tee bolts for mechanical joint accessories shall be fluorocarbon coated as specified herein.

D. Ductile Iron Flexible Restraint Joint Pipe and Fittings and/or Mechanical Joint Fittings

1. Ductile Iron Flexible Restraint Joint Pipe:

a. Pipe shall be centrifugally cast ductile iron conforming to the requirements of AWWA C151 for material, dimensions, tolerance, tests, markings, and other requirements.

b. Restrained joint pipe shall be designed for a water working pressure of 350 psi for pipe sizes 4-inch through 20-inch and 250 psi for pipe sizes 24-inch through 54-inch.

c. Flexible restraint joints shall consist of a boltless, glandless restraining system with factory applied spigot weld ring or weldment (weld bead of established height and width), which retains the wedge-shaped locking segments. These locking segments are either inserted into the bell prior to spigot engagement or inserted after spigot engagement by “caulking” a snap-ring into the bell, or inserting the segments through slots cast into the bell face.

d. Pipe that utilizes gaskets with embedded restraining gripper or friction segments is not acceptable.

e. Field applied weldments or weldments applied in a shop other than at the manufacturing facility are not allowed. Field cuts shall be restrained by cutting the barrel of the pipe and inserting it into a mechanical joint fitting and using wedge action retainer glands. As an alternative, flexible restrained closures may be incorporated into the Work provided they are accounted for in the approved laying schedule.

f. Manufacturer:

1) American Cast Iron Pipe Co. - Flex Ring.

2) Clow - Super Lock.

3) US Pipe - TR Flex.

4) Or approved equal.

2. Ductile Iron Restrained Fittings and Mechanical Joint Fittings:

a. All ductile iron fittings shall meet the requirements of AWWA C153 or AWWA C110.

b. Fittings may be either flexible restraint joint or mechanical joint. If flexible restraint joint fittings are used, a certain number of fittings must be mechanical joint to allow for field adjustments in line or grade.

c. Fittings that utilize gaskets with embedded restraining gripper or friction segments are not acceptable.

d. Field applied weldments or weldments applied in a shop other than at the manufacturing facility are not allowed.

e. Manufacturer of Flexible Restraint Joint Fittings:

1) American Cast Iron Pipe Co. - Flex Ring.

2) Clow - Super Lock.

3) US Pipe - TR Flex.

4) Or approved equal.

f. Manufacturer of Mechanical Joint Fittings:

1) American Cast Iron Pipe Co.

2) Clow - A Division of McWane, Inc.

3) Griffin.

4) Sigma Corp.

5) Star Pipe Products, Inc.

6) Tyler - A Division of McWane, Inc.

7) US Pipe.

E. Ductile Iron Anchor Pipe and Fittings

1. Ductile iron anchor pipe and fittings shall provide positive joint restraint by incorporating an integrally cast anchor gland (stop shoulder) at one end and an anchor, mechanical joint or plain end at the other end. The plain end, when fitted with a standardized mechanical joint gasket is to be inserted into a mechanical joint bell and bolted tight. A split, rotating ring shall be provided on the elbows, tees and on one end of the couplings or anchor pipe to permit vertical alignment regardless of the mating bolt hole alignment.

   a. Pipe shall be centrifugally cast ductile iron conforming to the applicable requirements of AWWA C151 for material, dimensions, tolerance, tests, markings and other requirements.

   b. Fittings shall conform to the applicable requirements of AWWA C110 or AWWA C153.

   c. Anchor pipe shall be furnished in lengths from 18-inches to 18 feet as shown or specified.

   d. Pipe and fittings shall be furnished complete with circular rubber gaskets conforming to AWWA C111, and other accessories as necessary for a complete installation.

   e. Manufacturer:

      1) Tyler - A Division of McWane, Inc.

      2) Clow - A Division of McWane, Inc.

      3) Or approved equal.

F. Ductile Iron Flanged Pipe and Fittings

1. Ductile Iron Pipe with Threaded Flanges:

   a. Pipe shall be centrifugally cast ductile iron conforming to the requirements of AWWA C151 and C115 for material, dimensions, tolerance, tests, markings, and other requirements.

   b. Pipe barrels and flanges shall have a taper pipe thread (NPT) in accordance with ANSI B1.20.1, with pipe diameters adapted to ductile iron pipe standard outside diameters.

   c. Flanged pipe shall be minimum Class 53 thickness and shall be furnished in standard laying lengths as specified or required.

   d. Manufacturer:

      1) American Cast Iron Pipe Co.

      2) Clow - A Division of McWane, Inc.

      3) US Pipe.

      4) Fast Fabricators, Inc.

2. Ductile Iron Flanged Fittings:

   a. Tees, bends, elbows, reducers, increasers and other such fittings shall be flanged ductile iron in accordance with the requirements of AWWA C110 and shall conform to ANSI A21.10, 250 psi rating.

   b. Reducers shall be eccentric unless otherwise specified.

   c. Manufacturer:

      1) American Cast Iron Pipe Co.

      2) Clow - A Division of McWane, Inc.

      3) Griffin.

      4) Sigma Corp.

      5) Tyler - A Division of McWane, Inc.

      6) Union Foundry Co., A Division of McWane, Inc.

      7) US Pipe.

3. Joints for Ductile Iron Flanged Pipe and Fittings:

   a. Flanged joints shall conform to the requirements of AWWA C110 and drilling and facing of flanges shall be in accordance with ANSI B16.1 Class 125 flanges unless otherwise specified.

   b. Flanged ductile iron pipe and fittings shall be furnished complete with all necessary joint accessories consisting of natural or synthetic rubber gaskets, 1/8-inch thick, full face; and, nuts, bolts and washers, unless otherwise specified.

   c. All nuts, bolts and washers for flanges and accessories shall conform to ANSI B18.2.1 and ANSI B18.2.2, respectively and shall be Type 304 stainless steel (exposed service), high strength, low alloy steel fluorocarbon coated (buried service) as specified herein.

G. Accessories

1. Flange Fillers, Blind Flanges and Reducing Companion Flanges:

   a. Conform to the requirements of AWWA C115 for material, dimensions, tolerance, tests, markings and other requirements.

   b. Drilling and facing of flanges shall be in accordance with ANSI B16.1, Class 125 flanges unless otherwise specified.

   c. Flanged fillers, blind flanges and reducing companion flanges shall be furnished complete with all necessary joint accessories consisting of natural or synthetic rubber gaskets, 1/8-inch thick, full face; and, nuts, bolts and washers, unless otherwise specified.

   d. Threaded outlets or taps, (Mueller threads), shall be provided in blind flanges as specified or required.

   e. All nuts, bolts and washers for flanges and accessories shall conform to ANSI B18.2.1 and ANSI B18.2.2, respectively and shall be Type 304 stainless steel, high strength, low alloy steel.

2. Caps and Plugs:

   a. Conform to the requirements of AWWA C110 for material, dimensions, tolerance, tests, markings and other requirements.

   b. Caps and plugs shall be mechanical joint or push-on joint and be furnished with all necessary joint accessories consisting of ductile iron follower glands, plain tipped rubber gaskets, nuts and bolts, unless otherwise specified.

   c. All nuts and tee bolts for mechanical joint accessories shall be fluorocarbon coated as specified herein.

   d. Threaded outlets or taps, (Mueller threads), shall be provided in plugs and caps as specified or required.

3. Solid Mechanical Joint Sleeves:

   a. Conform to the requirements of AWWA C153 for material, dimensions, tolerance, tests, markings, and other requirements of mechanical joint class 350 ductile iron solid sleeves.

   b. Unless otherwise specified, provide long laid length sleeves complete with follower glands, rubber gaskets and fluorocarbon coated nuts, tee bolts, and accessories.

4. Manufacturer

   a. American Cast Iron Pipe Co.

   b. Clow - A Division of McWane, Inc.

   c. Griffin.

   d. Sigma Corp.

   e. Star Pipe Products.

   f. Tyler - A Division of McWane, Inc.

   g. US Pipe.

H. Mechanical Joint Wedge Action Retainer Gland

1. Restraint shall be accomplished by use of a retainer gland that incorporates mechanical joint restraint into the follower gland with individually actuated wedges that increase their resistance to pull-out as pressure or external forces increase.

2. The joint restraint ring and its wedging components shall be made of grade 65-45-12 ductile iron conforming to ASTM A536. The wedges shall be ductile iron heat treated to a minimum hardness of 370 BHN. T-bolts shall be fluorocarbon coated as specified herein.

3. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell conforming to AWWA C111 and AWWA C153.

4. Torque limiting twist off nuts shall be used to ensure the proper actuation of the wedges. When the nut is sheared off, a standard hex head shall remain.

5. Manufacturer, for use on ductile iron pipe:

a. EBAA Iron, Series 1100 MEGALUG.

b. Uni-Flange Series 1400.

c. SIGMA One-Lok.

d. Star Pipe Products – Stargrip.

I. Push-On Ductile Iron Pipe Joint Restraining Device

1. When specified or allowed by the ENGINEER, restraining push-on ductile iron pipe joints shall be accomplished by use of a joint restraint system that consists of restraining rods and split ductile iron clamping rings, installed on the spigot and behind the bell. The clamping ring shall incorporate a series of machined serrations on the inside surface to provide 360-degree contact and support of the pipe barrel. Lateral thrust restraint is provided when the side clamping bolts are tightened allowing the serrations to lock onto the pipe barrel.

2. Threaded restraining rods and bolts and clamping bolts and nuts shall be fluorocarbon coated (buried service) or Type 304 stainless steel (exposed service).

3. The joint restraint rings shall be made of high strength, grade 65-45-12 ductile iron conforming to ASTM A536.

4. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell conforming to AWWA C111 and AWWA C153.

5. Restraining push-on joints as specified herein shall not be allowed for hydrant branches.

6. Restraining push-on joints shall be used on pipe sizes 6-inch to 12-inch only when allowed or specified. Restraining push-on joints in this manner shall not be allowed on pipe larger than 12 inches.

7. Manufacturer, for use on ductile iron pipe:

a. Uni-Flange Series 1450.

b. EBAA Series 1700.

c. Or approved equal.

J. Fluorocarbon Coated Nuts and Bolts

1. T-bolts shall be heat treated ductile iron material with a minimum of 65,000 psi tensile strength and 45,000 psi yield strength meeting ANSI/AWWA C111/A21-95.

2. Nuts and bolts shall have a fluorocarbon SC-1 coating.

3. Manufacturer:

a. Standco Industries.

b. Star Pipe Products.

c. Or approved equal.

K. Threaded Harnessing Rods and Bolting Accessories

1. Threaded harnessing rods shall only be used when approved by the ENGINEER.

2. Harness rods and nuts shall be heat treated steel with a minimum yield strength of 70,000 psi and a minimum ultimate strength of 110,000 psi.

3. Threads shall conform to American Standard Course Threads.

4. Rods and nuts shall be galvanized or cadmium plated, unless otherwise specified.

5. Non-coated materials may be protected with the application of two (2) coats of a bituminous preservative coating after installation.

6. Oil, grease, paint, or any coating which requires drying, will not be acceptable.

2.2 COATINGS, LININGS, AND POLYETHYLENE ENCASEMENT FOR DUCTILE IRON PIPE AND FITTINGS

A. Coatings and Linings for Ductile Iron Joint Pipe and Fittings

1. Ductile iron pipe and fittings shall be lined with a bituminous seal coated cement-mortar lining in accordance with AWWA C104, except the thickness for pipe shall be double that specified.

2. Ductile iron pipe and fittings shall be coated on the outside with a bituminous coating, approximately one millimeter thick. Fittings may be lined with an NSF/ANSI Standard 61 approved fusion bonded epoxy meeting the applicable sections of AWWA C116.

3. The exterior of flanged ductile iron pipe and fittings for exposed piping shall be coated with a primer coating suitable to receive epoxy paint finish paint system.

B. Polyethylene Encasement for Ductile Iron Pipe and Fittings

1. Polyethylene encasement shall be used for ductile iron pipe and fittings and on ductile iron fittings when using PVC pipe, conforming to AWWA Specification C105.

2. Polyethylene film shall be manufactured of virgin polyethylene material conforming to the following requirements of ASTM Standard Specification D1248 - Polyethylene Plastics Molding and Extrusion Materials.

3. Polyethylene film shall have a tensile strength of 1,200 psi minimum and shall allow elongation of 300 percent minimum and have a dielectric strength of 800 V/mil thickness minimum.

4. Polyethylene film shall have a minimum nominal thickness of 0.008 in (8 mils). The minus tolerance of thickness shall not exceed 10 percent of the nominal thickness.

5. Tape required to complete the installation shall be approximately 2 inches wide, plastic backed adhesive tape such as Polyken #900, Scotchrap #50 or approved equal.

6. Tube size or sheet width for each size of pipe shall be in accordance with AWWA C-105.

PART 3 EXECUTION

3.1 GENERAL

A. Refer to Section 15051 for buried piping installation, 15052 for exposed piping installation, and section 15140 for testing and disinfection.

3.2 PIPING SCHEDULE

Service	Pipe Materials	Fittings	Connections
Watermain Piping for water supply (buried and exposed) to Fire Suppression System	DIP	DIP	Refer to section 1.1.B.

END OF SECTION

SECTION 15109

CARBON STEEL PIPING SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Natural Fuel Gas Pipe and pipe fittings.

B. Valves.

1.2 RELATED SECTIONS

A. Section 01010 - Summary of Work.

1.3 REFERENCES

A. ANSI B31.2 - Fuel Gas Piping.

B. ANSI B31.9 - Building Services Piping.

C. ASME Sec. 9 - Welding and Brazing Qualifications.

D. ASME B16.3 - Malleable Iron Threaded Fittings.

E. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.

F. ASTM A120 - Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses.

G. ASTM A234 - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.

H. NFPA 54 - National Fuel Gas Code.

1.4 SUBMITTALS

A. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

1.5 PROJECT RECORD DOCUMENTS

A. Record actual locations of all piping, valves, and accessories.

1.6 OPERATION AND MAINTENANCE DATA

A. Maintenance Data: Include installation instructions, spare parts list, exploded assembly views.

1.7 QUALITY ASSURANCE

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulations.

C. Welders Certification: In accordance with AWS "Standard Qualification Procedure."

D. Maintain one copy of each document on site.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum 5 years' documented experience.

B. Installer: Company specializing in performing the work of this section with minimum 5 years' documented experience.

1.9 REGULATORY REQUIREMENTS

A. Perform Work in accordance with applicable New York State Code and National Fuel Gas Code.

B. Valve and appurtenances shall be Underwriters laboratory-listed.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Delivery, store, protect and handle products to site.

B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

C. Provide temporary protective coating on cast iron and steel valves.

D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.11 ENVIRONMENTAL REQUIREMENTS - NOT USED

1.12 EXTRA MATERIALS

A. Provide two repacking kits for each size valve.

PART 2 PRODUCTS

2.1 NATURAL GAS PIPING

A. Steel Pipe: ASTM A53 or A120, Schedule 40 black.

1. Fittings: ASTM A234, forged steel welding type.

2. Joints: NFPA 54, threaded or welded to ANSI B31.9.

2.2 FLANGES, UNIONS, AND COUPLINGS

A. Pipe size 2-inches and under:

1. Ferrous pipe: 150 psig malleable iron threaded unions.

2.3 BALL VALVES

A. Manufacturers:

1. American Valve.

2. Apollo Valve.

3. Or equal.

B. Ball valves shall have bronze two-piece body, chrome plated ball, Teflon seats, lever handle, and threaded ends.

C. UL Listed for natural gas.

PART 3 EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain elevation.

D. Install piping to conserve building space and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Provide clearance for installation of insulation and access to valves and fittings.

H. Provide access where valves and fittings are not exposed.

I. Install valves with stems upright or horizontal, not inverted.

J. Pipe vents from gas pressure relief valves to outdoors and terminate in weatherproof configuration.

K. Steel pipe shall be supported at maximum 7-foot spacing with minimum 1/4-inch diameter steel hanger rods.

L. Prepare pipe, fittings, supports, and accessories not prefinished ready for finished paint. Refer to Section 09900.

M. Provide support for utility meters in accordance with requirements of the local utility company.

N. Where pipe support members are welded to structural building framing scrap, brush clean, and apply one coat of zinc rich primer to welding.

3.3 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.

B. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

C. Provide a sediment trap in the main supply line upstream of branch or at each heater location.

3.4 TESTING

A. Natural gas piping shall be tested in conformance with NFPA 54, National Fuel Gas Code.

END OF SECTION

SECTION 15110

VALVES AND APPURTENANCES

PART 1 GENERAL

1.1 DESCRIPTION

A. Work Specified

1. The work specified shall include all labor, material, equipment, services, and incidentals necessary to furnish and install valves and appurtenances as shown, specified, and required.

2. This section defines the minimum requirements for all types of valves required for buried, exposed, submerged, and other types of piping, except where otherwise specifically included in other Sections.

B. Related Work Specified Elsewhere

1. Section 15063 - Steel Pipe and Fittings

2. Section 15106 - Ductile Iron Pipe, Fittings, and Accessories

3. Section 15140 - Testing and Disinfection

1.2 QUALITY ASSURANCE

A. Manufacturer’s Qualifications

1. Manufacturer shall have a minimum of 5 years’ experience producing valves and appurtenances, and shall show evidence of at least five installations in satisfactory operation.

2. Linestop installer shall have a minimum of 10 years’ experience completing tapping on PCCP mains, and shall show evidence of similar experience information to include, but not limited to, work location, pipe information, and field personnel.

3. Parts Interchangeability: It is the intent of these specifications that all materials furnished herein shall be compatible with similar materials of other manufacturer’s.

B. Reference Standards

1. ANSI B16.1, Cast Iron Pipe Flanges and Flanged Fittings

2. ANSI B16.4, Cast Iron Fittings

3. ASTM A48, Standard Specification for Gray Iron Castings

4. ASTM A126, Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings

5. ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

6. ASTM A354, Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs and Other Externally Threaded Fasteners

7. ASTM A436, Standard Specification for Austenitic Gray Iron Castings

8. ASTM A536, Standard Specification for Ductile Iron Castings

9. ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings

10. AWWA C-111 for mechanical joint ends

11. AWWA C500, Standard for Metal-Seated Gate Valves for Water Supply Service

12. AWWA C504, Standard for Rubber-Seated Butterfly Valves

13. AWWA C508, Standard for Swing Check Valves for Waterworks Service, 2-inch (50 mm) through 24-inch (600 mm) NPS

14. AWWA C509, Standard for Resilient Seated Gate Valves for Water Supply Service

15. AWWA C800, Underground Service Line Valves and Fittings

16. American Gear Manufacturers Association (AGMA) Standards

17. NEMA, National Electrical Manufacturer's Association

18. NEC, National Electrical Code

19. NSF/ANSI Standard 61

20. Underwriter's Laboratories (UL)

21. International Organization for Standardization (ISO)

22. Factory Mutual Research Corporation

23. 1996 Safe Drinking Water Act

24. Manufacturing Standardization Society of the Value and Fittings Industry (MSS)

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's literature, illustrations, specifications, detailed drawings, data and descriptive literature on all valves and appurtenances.

2. Deviations from Drawings and Specifications.

3. Engineering data including dimensions, materials, size, operator orientation, and weight.

4. Fabrication, assembly, installation and wiring diagrams.

5. Linestop valve information shall include but not limited to: pipe taps/sleeves, drilling apparatus, linestops, tapping valves, surface coatings, installation and testing instructions, and all other equipment and materials necessary to complete the work.

B. Operation and Maintenance Data: Submit complete manuals including:

1. Copies of all Shop Drawings, test reports, maintenance data and schedules, description of operation, and spare parts information.

C. Shop Tests: Submit for approval the following:

1. Hydrostatic tests for each valve when required by the valve specifications included herein.

2. Each gate valve shall have the leakage test required by Section 5 of AWWA C509 performed with the pressure differential applied in both directions.

3. The manufacturer of butterfly valves shall submit certified copies of reports covering the bi-directional leakage tests in accordance with Section 6, AWWA C504.

D. Certificates:

1. Where specified or otherwise required by ENGINEER, submit test certificates.

2. The CONTRACTOR shall submit certificates of compliance with the applicable referenced standards.

3. Submit certificate of compliance with NSF/ANSI Standard 61 for all products under this section, including interior coatings, by an independent, authorized laboratory.

E. Delivery Tickets:

1. Furnish delivery tickets indicating the valve manufacturer, valve type and class, identifying that the valves are new and from a manufacturer that has been submitted and approved.

F. Testing Criteria:

1. CONTRACTOR must provide manufacturer's test specifications for all tapping sleeve and valves prior to field testing.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. During delivery and handling, all materials shall be braced and protected from any distortion or damage; any such distortion or damage shall be basis for rejection of the materials.

B. Equipment used for unloading shall be covered with wood or rubber to avoid damage to the exterior of the valves and accessories. Do not drop or roll materials off trucks. All valves and appurtenances shall be handled with padded slings or other appropriate equipment. The use of cables, hooks or chains will not be permitted.

C. The materials shall be inspected before and after unloading. Materials that are found to be cracked, gouged, chipped, dented or otherwise damaged will not be accepted.

D. Interiors of valves and appurtenances shall be kept free from dirt and foreign matter.

E. Store valves and appurtenances on heavy wood blocking or platforms so they are not in contact with the ground.

F. Valves and appurtenances shall be unloaded opposite to or as close to the place where they are to be used as is practical to avoid unnecessary handling.

PART 2 PRODUCTS

2.1 MATERIALS

A. General

1. All products, including interior coatings, shall be suitable for use in a potable water system.

2. All products, including wetted parts, shall be certified to meet NSF/ANSI Standard 61.

3. Valves shall have manufacturer's name and working pressure cast in raised letters on valve body. Valves shall be suitable for test pressures.

4. Manual valve operators shall turn clockwise to close unless otherwise specified. Valves shall indicate the direction of operation.

5. Valve shall be treated as a bulkhead (dead end) condition and pipe joints shall be restrained on both sides of the valve for the lengths as shown, specified, or required.

6. All valves, operators, and appurtenances shall be designed to withstand the working and hydrostatic test pressures as specified.

7. Unless otherwise specified all flanged valves shall have ends conforming to ANSI B16.1, Class 125.

8. All bolts, nuts and studs shall, unless otherwise approved, shall conform to ASTM A307, Grade B; or ASTM A354. All bolts, nuts, and studs on or required to connect submerged or buried valves shall be fluorocarbon coated.

9. Bolts and nuts shall have hexagon heads and nuts.

10. Gasket material and installation shall conform to manufacturer's recommendations.

11. Identification: Identify each valve 4 inches and larger with a brass or stainless steel nameplate stamped with the approved designation. Nameplate shall be permanently fastened to valve body at the factory. Stenciled designations are acceptable for buried valves.

12. All valves and appurtenances must be new materials in first-class condition. Used or recycled materials will not be allowed, regardless of condition.

B. Butterfly Valves

1. Butterfly Valve - General

a. Butterfly valves shall be manufactured in accordance with the latest revision of AWWA C504, Class 150B and conform to NSF Standard 61. Valves shall have flanged ends for exposed installations and mechanical joints for buried installations.

b. Valves for buried applications shall have mechanical joint ends and be restrained per Section 15106.

c. Valve bodies shall be constructed of ASTM A126, Class B cast iron for flanged valves or ASTM A48, Class 40 for wafer style. Flanged valves shall be fully faced and drilled in accordance with ANSI Standard B16.1, Class 125, and match existing.

d. Valves shall have Rubber body seats and shall be of one piece construction, simultaneously molded and bonded into a recessed cavity in the valve body. Seats may not be located on the disc or be retained by segments and/or screws.

e. Valve bearings shall be of a self-lubricating, nonmetallic material to effectively isolate the disc-shaft assembly from the valve body. Metal-to-metal thrust bearings in the flow stream are not allowed. Valve bearing load shall not exceed 1/5 of the compressible strength of the bearing or shaft material.

f. The disc shall be a lens-shaped Class B cast iron disc with a stainless steel type 316 edge with demonstrated test results of 100,000 cycles of drip tight capability.

g. Discs shall be retained by stainless steel pins which extend through the full diameter of the shaft.

h. Valve shafts shall be of stainless steel type 304 and solid one piece design for valve sizes 3" through 20" and stub shaft design for valves larger than 24" in diameter with an adjustable thrust bearing to center the valve disc. At the operator end of the valve shaft, a shaft seal utilizing "V" type chevron packing shall be utilized. "O" ring and/or "u" cup packing is not allowed.

i. Valve bearings shall be as specified in Sect. 3, AWWA C504. The shaft bearings shall be Teflon or Teflon lined/fiberglass backed.

j. All surfaces of the valve interior shall be clean, dry and free from grease before painting. The valve interior and exterior, except for disc edge, rubber seat and finished portions shall be evenly coated with an NSF61 approved 2-part liquid epoxy. Minimum dry film thickness shall be 8 Mils minimum.

k. Identification: Identify each valve with a brass or stainless steel nameplate stamped with the approved designation. Nameplate shall be permanently fastened to valve body at the factory.

l. All butterfly valves and their operators shall be for suitable for exposed service and shall open counterclockwise.

m. All other bolts, nuts, and studs shall, unless otherwise approved, be fluorocarbon coated. Bolts and nuts shall have hexagon heads and nuts.

2. Operators

a. Operators shall be permanently lubricated and totally enclosed and be provided with a handwheel, chainwheel or 2-inch square nut, for manual valves or electric actuators for motorized valves as indicated on the contract drawings.

b. Operators shall turn clockwise to close the valve.

c. Operators shall be equipped with a totally enclosed permanently lubricated lever-traveling nut drive, self-locking type and shall be designed to hold the valve in any intermediate position between "fully open" and "fully closed" without creeping or fluttering.

d. Operators shall be equipped with adjustable stop-limiting devices to prevent over travel of the disc in the open and closed positions. Stops shall be located within the operator housing and be capable of adsorbing the full operator torque with minimum safety factor of 5.

e. Operator housing, supports and connections to the valve shall have provisions for four-bolt mounting.

f. Operator components shall withstand an input torque of 450 footpounds at the extreme operator positions without damage.

g. Enclosed lever-traveling nut operators shall have a gear ratio designed not to exceed 80 pounds pull to meet the required operator torque.

h. Extension stems shall not be allowed. All valves shall be located such that the cover over the top of the operating nut shall not exceed 5-foot in depth.

3. Manufacturer:

a. Henry Pratt Co.

b. DeZurik.

c. Crispin.

d. Or approved equal.

C. Check Valves – Pump Discharge

1. Manufacturer:

a. ValMatic, Model SurgeBuster Check Valve.

b. Dezurik, APCO-CRF100.

c. Henry Pratt, PSI Surge Inhibitor.

d. Or approved equal.

2. The valve shall swing open smoothly at pump start and close quickly and quietly upon pump shutdown to prevent flow reversal. When closed, the valve shall seat drop tight. The valve shall be appropriate for installation in both the horizontal and vertical positions. The valve shall be tight seating. Valve shall have a disc accelerator and position indicator.

3. Check valve shall be of the flanged, full body type with a domed access cover and no internal moving parts except for the flexible disc and disc accelerator. The flanged ends shall be manufactured in accordance with ANSI B16.1 Class 125. Valves shall be rated to 250 psi for all sizes.

4. The valve body shall be constructed of ductile iron ASTM A-536 Grade 65-45-12 with flow area equal to the nominal pipe inside diameter throughout the valve. Seat shall be constructed on a 45 degree angle to reduce disc travel. The seat and internal body shall be fully coated with a two part thermosetting epoxy suitable for use in potable water applications. A threaded port with pipe plug shall be provided on the bottom of the valve to allow for field installation of a backflow actuator or oil cushion device without special tools or removing the valve from the line.

5. The top access port shall be full size, allowing removal of the disc without removing the valve from the line. The access cover shall be domed in shape to provide flushing action over the disc for operating in lines containing high solids content. A threaded port with pipe plug shall be provided in the access cover to allow for field installation of a mechanical, disc position indicator.

6. The disc shall be of one-piece construction, precision molded with an integral O-ring type sealing surface and reinforced with alloy steel. The flex portion of the disc contains nylon reinforcement and shall be warranted for twenty-five years. Non-Slam closing characteristics shall be provided through a short 35 degree disc stroke and a disc accelerator to provide a cracking pressure of 0.3 psig.

7. The disc accelerator shall be of one piece construction and provide rapid closure of the valve in high head applications. The disc accelerator shall be enclosed within the valve and shall be field adjustable and replaceable without removal of the valve from the line. The disc accelerator shall be securely held in place captured between the cover and disc. It shall be formed with a large radius to allow smooth movement over the disc surface.

8. The valve disc shall be cycle tested 1,000,000 times in accordance with ANSI/AWWA C508 and show no signs of wear, cracking, or distortion to the valve disc or seat and shall remain drop tight at both high and low pressures.

9. The valve shall have a replaceable stainless steel body seat.

10. The disc shall be precision molded Buna-N (NBR), ASTM D2000-BG. Optional disc material includes Viton, EPDM, Hypalon. The Disc Accelerator shall be Type 302 Stainless Steel.

11. Pump discharge check valves shall have a position indicator and connection to OWNERS SCADA system.

D. Surge Relief Valves

1. The relief valve shall be globe (inline) body with flanged end connections, be fully mounted, external pilot operated, with free floating piston (operated without springs, diaphragm or levers).

2. It shall contain a single full-ported seat, with seat bore equal to size of valve. The minimum travel of the piston shall be equal to 25% of the diameter of the seat.

3. The piston shall be cushioned to insure positive closure.

4. The main valve diaphragm shall be (packed with) rubber, leather material is not acceptable.

5. The valve shall be furnished with an indicator rod to show position of piston opening, and pet-cocks for attachment to valve body for receiving gauges for testing purposes.

6. The pilot valve, controlling operation of the main valve, shall have a range of adjustment, be easily accessible, and arranged to allow for easy removal from the main valve while the main valve is under pressure.

7. The pilot valve, speed control valve, external strainer with blow-off, isolation valves, and all associated rigid brass piping, and fittings (with the exception of a separate static pressure sensing line, if required) shall be factory assembled and furnished with the valve.

8. Valve body and cap(s) shall be constructed of gray iron castings that conform to ASTM Specification A 126 Class B. Internal bronze components shall conform to ASTM Specification B-584. Internal Stainless Steel components shall conform to ASTM Specification A-743 Grade CF-8 or CF-8M.

9. Pilot valve seats shall be stainless steel.

10. The control piping shall be rigid red brass, no less than 0.5-inch diameter.

11. Ferrous surfaces of the valve shall be coated with NSF Certified epoxy in accordance with ANSI/NSF Std. 61.

12. Manufacturer:

    a. GA Industries, Figure 6700 (globe).

    b. CLA-VAL, Model 50-01 BPVY.

    c. Or Approved Equal.

E. Resilient Seat Gate Valves (Buried Service)

1. General

    a. The design working pressure and test pressure for all valve sizes shall be as described in AWWA C509 and materials conforming to C509. All valves shall be designed to operate vertically in a horizontal pipeline.

    b. The valve disc shall be fully encapsulated with a synthetic elastomer and shall seat against a corrosion-resistant surface.

    c. Valves for buried applications shall have mechanical joint ends and be restrained per Section 15106.

    d. All bolts and nuts, including bonnet assembly and seal plate hold-down, shall be fluorocarbon coated high strength, corrosion resistant low alloy steel.

    e. Valves for exposed applications shall have flanged ends conforming to ANSI B16.1, Class 125 conforming to ANSI A21.11.

    f. Thin walled AWWA C515 valves shall not be allowed.

2. Gate Valve

    a. The body, bonnet, seal plate, disc and hub nut shall be iron.

    b. Non-rising valve stem, stem nuts, glands and bushings shall be bronze.

    c. Shaft "O"-ring seals shall be synthetic rubber or Buna-N and shall be capable of being replaced under pressure.

    d. All internal parts shall be accessible without removing the main body from the pressurized line.

3. Operators

   a. Operator shall be suitable for buried service.

   b. Operators shall be as specified in AWWA C509 for submerged, buried, or in-plant service as specified.

   c. Operators shall be equipped with a 2-inch square operating nut and shall be full gasketed and grease packed for buried service. Operating nuts shall turn clockwise to close the valve. A cast arrow showing the direction of valve opening shall be supplied.

4. Manufacturer:

   a. Mueller, 2360-16.

   b. Kennedy Valve Company, No. 8571.

   c. Or approved equal.

F. Altitude Valve with Reduced Port Seat

1. Valve

   a. The Altitude Valve shall control the rate of flow and maintain the last position in the event of a power failure. The valve shall also provide a flow signal with totalizer based on valve position and differential pressure.

   b. Valve shall be globe style, in-line, 48” Reduced Port.

   c. Valve pilot piping shall be on a single side of the valve. See contract drawings for location.

   d. Valve shall be hydraulically operated, single diaphragm-actuated, and globe pattern. The valve shall consist of three major components: the body with seat installed, the cover with bearing installed, and the diaphragm assembly. The diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. Packing glands and/or stuffing boxes are not permitted and there shall be no pistons operating the main valve or pilot controls. Rolling Diaphragms in the main valve will not be accepted.

   e. Valve shall include a factory installed Differential Pressure Transmitter constructed of 316 Stainless Steel with the electronics housed in a NEMA 4X Enclosure and transmit pressure signals via 4-20mA signal.

   f. Valve shall include a factory installed Valve Position Transmitter to indicate position of the valve. Transmitter shall provide an output of 4-20mA signal directly proportional to the valve position and be housed in a NEMA 4X enclosure.

   g. Valve Pilot Control System shall consist of dual solenoids which alternately apply or relieve pressure to the diaphragm chamber to position the main valve. The valve inlet solenoid shall be normally closed (energized to open) and the valve outlet solenoid shall be normally closed (energized to open) 24VDC with NEMA type IV enclosure. A manual system to by-pass/override the solenoids shall also be provided. The pilot control system shall also include a “Y” strainer to protect the controls from foreign material, isolation valves for maintenance and testing purposes, and independently adjustable opening and closing speed controls.

Pilot Control System Materials

i. Solenoid Body: Brass ASTM B283

ii. Rubber Material: Buna-N

iii. Voltage: 120/60 VAC

iv. Enclosure Type: NEMA 4

v. Pilot Control Body & Cover: Bronze ASTM B-62

vi. Trim: Stainless Steel Type 303

vii. Rubber Material: Buna-N

viii. Tubing and Fittings: Stainless Steel tubing, fittings, ball valves, and CV flow controls

ix. Operating Fluids: Water

x. Desired Options: Opening and Closing Speed Controls, DPT, Pressure Gauges P1/P2, CK2 Pilot System Isolation Valves

2. Valve Materials

   a. Main Valve Body and Cover: Ductile Iron ASTM A-536

   b. Main Valve Trim: Stainless Steel Type 316

   c. End Detail: 150 # Flanged ANSI B16.42

   d. Pressure Rating: 250-PSI Maximum Working Pressure

   e. Temperature Range: To 180 Degrees Fahrenheit

   f. Rubber Material: Buna-N

   g. Coating: Internal/External Heat Fusion Epoxy Coating 6 mils thick NSF-61 approved

3. Electronic Valve Controller

   a. The electronic valve controller shall provide the interface between the hydraulic control valve and tie into the RTU Panel.

   b. Controller shall be preinstalled with standard valve application templates allowing the Electronic Valve Controller to easily be configured to perform a control valve individual or multiple functions to match the application(s) desired of the valve in the piping system. Designed to provide fully programmable monitoring and hydraulic valve control for rate of flow, pressure reducing, pressure sustaining, level control (altitude and modulating), valve position, blending, pressure management or select combinations of any of these applications.

   c. Rate of Flow Control to the existing tank is the intended control use.

d. Solenoid pilot controls equipped onto the control valve shall be actuated by electrical signals received from the electronic valve controller, which shall enable remote control over the diaphragm valve operations. The solenoid pilots either add or relieve line pressure from the cover chamber of the valve, causing it to open or close as directed by the electronic valve controller. The electric solenoid pilot controls can also be combined with hydraulic or electronic motorized pilot controls to create dual function, or fail-safe capability. The electronic valve controller shall accept an analog 4-20mA feedback signal. Upon receiving the remote setpoint command from the RTU panel from the operator, the electronic valve controller shall provide proper signals to modulate and maintain the valve at the desired setpoint value. When the feedback signal deviates from the setpoint, using a built in control PID algorithm, the appropriate opening or closing solenoid on the valve will pulse. As the feedback signal approaches the setpoint, this on/off pulse time will gradually decrease to smoothly modulate the valve to setpoint. Each solenoid is controlled by a solid state relay with zero switching voltage. The total cycle time between each pulse shall be programmable. When the feedback signal is within a programmable dead band, the opening and closing solenoids will lock the cover and the valve will maintain position.

e. The controller shall include six (6) configurable 4-20mA analog inputs; six (6) dry contact digital inputs; four (4) 4-20mA analog outputs; two (2) solid-state relays and two (2) mechanical relays. All inputs and outputs shall have a configuration menu which programs signal name, scaling, engineering units, precision, & filtering. When a setpoint or feedback signal has been lost, the controller shall be configured to maintain some known value. When local mode is selected, the controller shall have the ability to output a signal & screen warning noting a local condition.

f. Controller shall include a maximum of four (4) PID loops for multi-function control, with local or remote set point inputs. Each loop shall have the ability to be broken into (4) different control zones with customizable PID parameters in each. The controller shall have a programmable set point ramping feature which linearly changes a set point over time until the desired value is achieved. The electronic valve controller shall have real time dynamic charting capability to compare set point vs feedback signals. Each PID loop shall have an independent output limiting feature which limits the duration a solenoid can remain energized, providing ultimate system protection. In the event of a signal loss, the PID shall have the ability to lock valve in last position, close valve, or open valve.

g. The electronic controller shall have relay outputs capable of Alarm indication to RTU panel and shall be capable of generating and sending signal loss warnings and other configurable control actions. Actions (alarm) can include valve failures, other valves to open/close.

h. The controller shall include a built-in flow rate calculator. The electronic valve controller shall come equipped with Control Curves valuable in making relationships against other signals, internal variables, or time.

i. The electronic valve controller shall have the ability to retransmit any input signal, variable, or calculation to the RTU panel.

j. The electronic valve controller shall have a high speed logging feature which captures all I/O at a maximum sample rate of 1Hz. Captured data shall be downloadable in .csv file format to a portable memory device such as a USB drive or FTP server. The controller shall have a color TFT screen to graphically display the valve application with real-time system information. The controller display shall have the ability to show all I/O signal readings, PID settings, I/O configuration settings, along with customizable graphics for various warnings.

k. Enclosure shall be IP-68 rated to house the controller for environmental protection with five button operator interface keypad.

l. Controller shall be provided with AC/DC power supply converter in IP-68 enclosure.

4. Valve Manufacturer:

a. CLA-VAL, Model:633-BL (100-20 reduced port with VC-22D controller).

G. Temporary Linestop Assembly

1. General

a. Two linestops shall be installed; one on the 48" pump station/tank inlet line and one on the 42" pump station outlet line. Refer to appendix G for available prestressed concrete cylinder pipe (PCCP) as-built information for inlet line (Line A) and outlet line (Line E).

2. Design Specifications

a. Factory Pressure Test: Each valve shall be pressure tested and serialized for traceability before leaving the manufacturing facility.

b. Integrated Lifting Gussets: Incorporated to facilitate safe handling.

c. Test and Working Pressures: 50 psi working pressure. 100 psi test pressure max.

3. Materials:

a. Tapping sleeve assemblies shall be manufactured for PCCP use. Body shall be ASTM A283 Grade C Carbon Steel, flanges AWWA C207 Class D, ANSI 150#, NSF-61 Buna N gasket materials, and carbon steel straps/seal plate/grout pipes

b. Temporary isolation valve (knife Gate type) shall be provided to meet installer requirements for mounting between tapping sleeve and linestop valve housing, flange connections, sealing, and pressure requirements.

c. Temporary linestop valve:
i. Folding plug head linestop capable of pressure tight seal against inside diameter of existing pipe.

ii. Linestop shall advance into and retract from pipeline by means of hydraulic or mechanical actuator. When retracted the folding plug head shall be housed in pressure tight chamber between the actuator and temporary isolation valve.

iii. Folding plug: Capable of displacing accumulated grit deposits in interior of the pipe while advancing to its linestopping position and have molded polyurethane sealing element around its perimeter and supply workable seal with interior diameter when fully advanced.

d. Completion Plug: Manufactured from ASTM A283 Grade C, ASTM A36 or equal steel. Equipped with two circumferential grooves; one to receive the locking device from flange, and second to contain compressible "O" ring to seal pressure tight against interior diameter of nozzle.

e. Blind Flange: To seal tapping saddle assembly upon removal of tapping and linestop equipment. Manufactured from AWWA C207, Class D steel and drilled to match bolt circle of nozzle of tapping saddle assembly.

f. Bolts and nuts shall be high strength, low alloy steel and fluorocarbon coated.

g. NSF-61 epoxy finish coating shall be applied to materials per manufacturer standards.

4. Fabricators/Installers:

a. Garrison Enterprises.

b. Or Approved Equal

2.2 VALVE APPURTENANCES

A. Valve Boxes. Provide each buried valve with a valve box as follows:

1. Valve boxes shall be furnished and installed for all valves and shall be standard size.

2. Valve boxes shall have a screw type adjustment and shall be three-piece type boxes.

3. Valve boxes shall be firmly supported in such a manner that no impact or stress shall be carried to the valve.

4. Boxes shall be set and maintained centered and plumbed over the cap nut of the valve with box cover flush with surface of finished pavement or as directed by the ENGINEER.

5. Provide extension stem and operating nut for each valve. Extension stems shall be provided with a 150 ft. lb. shear pin installed as close to the top of the extension stem as possible. Extension stems shall terminate 2 feet below finished grade.

6. Valve boxes shall be supplied by the valve manufacturer, in order to ensure a proper working system and be suitable for HS-20 loading. Arrangement shall be suitable for installation with the grade being approximately 5 to 8 feet above the centerline of the valve.

B. Valve Indicator Posts

1. Furnish and install Valve indicator post as indicated on the Contract Drawings.

2. Valve indicator post shall be adjustable type and operate on a 6” valve. Shall be UL 1091 and FM 1110 approved.

3. Valve Indicator Post shall be cast or ductile iron body; wafer type or with flanged or grooved ends. Post shall be visual and include an integral indicating device and ends matching connecting piping and shall include a supervisory tamper switch designed to detect tampering and valve closure.

4. Supervisory Tamper switch shall be integrated to valve indicator post and be housed in a NEMA 4X enclosure UL Listed; all parts shall have corrosion resistant finishes. Shall include two knockouts for conduit connection.

5. Supervisory switch operating temperature range shall be -40 degrees C (-40 degrees F) to 60 degrees C (140 degrees F).

6. Manufacturers:

a. Valve Indicator Post: Mueller Water Products, Tyco Fire Suppression & Building Products, McWane Inc., or approved equal.

b. Supervisory Switch: Potter- PCVS Series or approved equal.

2.3 PAINTING

A. Shop Painting

1. Clean and prime coat ferrous metal surfaces.

2. All interior wetted ferrous surfaces of valves and appurtenances except finished or bearing surfaces shall be shop-painted with an approved epoxy paint system certified to NSF/ANSI Standard 61 for potable water and applied in accordance with the paint system manufacturer's recommendations.

3. Coat machined, polished and non-ferrous surfaces including gears, bearing surfaces and similar unpainted surfaces with corrosion prevention compound listed in NSF/ANSI Standard 61 and applied in accordance with the manufacturer's recommendations. Maintain coating during storage and until equipment begins operation.

PART 3 EXECUTION

3.1 INSPECTION AND PREPARATION

A. During installation of all valves and appurtenances, the CONTRACTOR shall verify that all items are clean and free of defects in material and workmanship and function properly.

B. All valves shall be closed and kept closed until otherwise directed by the ENGINEER.

3.2 INSTALLATION

A. Install valves and appurtenances as shown on the Drawings and in accordance with the manufacturer's recommendations.

B. All valves shall be kept in the closed position until otherwise directed by the ENGINEER. Hydrant valves shall be opened during the hydrostatic testing and then closed until the watermain is placed into service.

C. Install all valves so that handwheels, levers, or wrenches can be conveniently turned from operating area and as approved by the ENGINEER.

D. Install all valves plumb and level unless otherwise approved. Valves shall be installed free from distortion and strain caused by misaligned piping/equipment or other causes.

E. CONTRACTOR shall operate each valve full open to full close in the presence of ENGINEER. The number of turns shall be recorded and provided to OWNER with the Record Drawings.

F. Valve extended bonnets shall be set plumb and centered with the bodies directly over the valves. Earth fill shall be carefully tamped around each valve bonnet extension to a distance of 4 feet on all sides, or to the undisturbed trench face, if less than 4 feet.

3.3 FIELD TESTS AND ADJUSTMENTS

A. Adjust all parts and components as required to provide correct operation.

B. Conduct functional field-test of each complete valve assembly in the presence of the ENGINEER to demonstrate that each part and all components together function correctly. All testing equipment required shall be provided.

3.4 VALVE SCHEDULE

A. Refer to the Contract Drawings for locations and valve schedule.

END OF SECTION

SECTION 15115

ELECTRIC VALVE ACTUATORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electric valve actuators for butterfly valves.

B. Actuators shall be provided by the butterfly valve manufacturer and provided with the valve assemble as a complete package.

1.2 REFERENCES

A. NEMA Standards, National Electrical Manufacturer's Association.

B. NEC, National Electric Code.

C. UL/IEC Standards for Electrical Components.

1.3 RELATED SECTIONS

A. Section 15100 – Valves and Appurtenances.

1.4 PROGRESS SUBMITTALS

A. Provide submittals that clearly illustrate compliance to the specifications and Contract Drawings. CONTRACTOR shall provide documentation with pertinent data clearly highlighted that illustrates that proposed equipment complies with this specification.

B. Shop Drawings: Submittals shall include but not be limited to the following:

1. Manufacturer's literature, illustrations, specifications, detailed drawings, data, and descriptive literature on all proposed actuators and appurtenances including dimensions, materials, size, and weight.

2. Documentation showing the required normal and maximum operating torque of each valve verses the torque ratings of the actuator selected for use on that valve.

3. List of all actuators indicating tag number, full part numbers and type (on/off, modulating). Also include manufacturer's ordering information defining the breakdown of the products part number.

4. Submit certificates of compliance with referenced standards.

5. Detailed description of all testing configurations and proposed test procedures.

6. Where specified or otherwise required by the ENGINEER, submit test certificates.

7. Manufacturer's Instructions: Indicate application conditions and limitations of use. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

8. Operation and Maintenance Data: Include bound copies of operating and programming instructions, adjustments, and preventative maintenance procedures and materials. Provide operating and maintenance instructions, including parts lists for all of the equipment.

9. Schematic wiring diagrams (SWD): Indicate how the actuators are wired to the control system and AC power. Provide electronic and printed drawings using the latest version of AutoCAD

C. Calculations or data used for sizing of the actuators.

1.5 CLOSEOUT SUBMITTALS

A. Manufacturer’s Warranty:

1. All warranties shall individually start at the time the commissioning of the actuator is completed and accepted in writing by the OWNER or his representative.

2. Provide the manufacturer’s standard written warranty on all materials and workmanship for a minimum of two (2) years.

3. Provide a minimum 5-year manufacturer's written warranty against breakage of any mechanical drive components, leakage of the housing seals and failure of the control or communication circuit components.

4. Fill out original warranty forms in the OWNER's name and register with manufacturer.

B. Operation and Maintenance Manual

1. Operation and maintenance manuals, shall include at a minimum:

a. Sectional drawings.

b. Parts list with recommended spares.

c. Operation instructions.

d. Maintenance instructions.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Installer: The installer shall have a minimum of five (5) years of experience installing actuators and appurtenances, and shall show evidence of at least five (5) installations (similar to the Work required for this Project) in satisfactory operation.

B. Testing:

1. Actuators are to be assembled to their valve, setup and tested and shipped as an assembly by the valve manufacturer. The exception is with spare actuators that will be tested independently.

C. Delivery, Handling and Storage:

1. Delivery of Materials: No materials shall be shipped without the written consent of the ENGINEER upon review of all submittal and testing information. The CONTRACTOR is responsible to inspect all materials received for size, quality, and quantity against the approved shop drawings.

2. Handling of Materials: The CONTRACTOR shall carefully handle all products. Any component that is dropped, dented, or damaged by the CONTRACTOR or as a result of delivery or storage shall not be incorporated into the final assembly. The CONTRACTOR at his expense shall replace the component.

3. Storage of Materials: All materials shall be stored in the original package of the manufacturer whenever possible. The products shall be labeled. They shall be stored in a covered, dry location until installation.

PART 2 PRODUCTS

2.1 OPERATING ENVIRONMENT:

A. Continuously operating (24 hours per day, 7 days per week) municipal water facilities.

B. Non-hazardous industrial environment (damp, humid, dust, and dirt).

C. Indoor temperature range of 0 degrees C (32 degrees F) to 40 degrees C (104 degrees F) and relative humidity 0 percent to 95 percent.

D. Outdoor temperature range of -29 degrees C (-20 degrees F) to 60 degrees C (150 degrees F) and relative humidity 0 percent to 95 percent.

E. Electrical classification is General Purpose.

2.2 MECHANICAL

A. Electric Valve Actuators for Motorized Butterfly Valve 1, 2, and 3 shall be modulating rated.

B. The CONTRACTOR shall determine the correct actuator locations and sizes required for the process conditions as indicated by the Contract Drawings and specifications. Butterfly valves requiring motorized actuation are outlined in the Valve Schedule and on the Contract Drawings. In general terms, each device shall be an externally mounted actuator utilizing an AC motor to produce a rotary or linear motion for the position control of a mechanical valve.

C. The actuator enclosure shall meet or exceed IP-67 specifications (watertight, corrosion resistant, and temporarily submersible).

D. All cover screws and fasteners, as well as mounting hardware, shall be stainless steel.

E. The actuator shall be suitable for operation at any angle.

F. Speed reduction shall be achieved utilizing spur, helical, bevel, and/or worm type gears. All gearing material shall be either steel or bronze. Aluminum and/or non-metallic gear material shall not be utilized. The time to travel from full open to full closed, or vice versa, shall be 30 seconds.

G. All gears and shafts shall be fully supported on anti-friction bearings. Where susceptible to thrust loads, roller type or axial thrust type bearings shall be utilized.

H. Gears and shafts shall be lubricated. Mechanical seals shall be provided and shall contain the lubricant regardless of shaft position. Lubricants shall be suitable for the site conditions indicated in this section.

I. Each actuator shall include a handwheel or crank for manual operation of the valve if motor power is unavailable. The handwheel or crank shall require no more than 80 ft. lbs. of rim pull to operate. Operation of the motor shall not transmit motion to the handwheel and operation of the handwheel shall not cause the motor to rotate. When the handwheel is in use, no motor torque shall be capable of being transmitted to the handwheel. The actuator body shall include an indication of required direction of handwheel rotation to open and to close the valve.

J. The lever or handle used to disengage the clutch shall be capable of being padlocked in either the manual or motor mode.

K. Valve position shall be locally indicated on the actuator and clearly indicate closed vs. open position.

L. All quarter turn valve actuators shall include field adjustable mechanical stop limiting devices, one at full open and one at full closed, to prevent over travel.

M. Mechanically actuators must be fully repairable in the field using standard hand tools and not require return to the factory for repair.

2.3 ELECTRICAL

A. Actuators shall operate from +/- 10 percent of the 480 VAC, three-phase 60 Hz service power. Plant distribution wiring is designed for a maximum voltage loss of 5 percent.

B. The AC motor shall be specifically designed for use in actuators and shall be suitable for operation from the voltage indicated.

C. The motor shall be totally enclosed and non-ventilated. Insulation shall be Class F. The actuator shall be provided with thermostatic and overload relay protection integral to the actuator.

D. The CONTRACTOR shall select and size the actuators for open/close as required for the specific application in accordance with the manufacturer's recommendations. Regardless of the service type, the maximum output torque of the actuator shall be equal to or greater than two times the maximum output torque required to operate the associated valve.

E. Two field adjustable position limit switches shall be included and shall be capable of indicating valve fully closed, valve fully open, or any positions in between. The installed setup shall have one switch set at the valve fully opened position and the other at valve fully closed.

F. Field adjustable torque limit protection shall be included and shall be capable of interrupting the control circuit when the predetermined torque is exceeded at the fully open position, the fully closed position, or if the torque is exceeded during travel in either direction due to an obstruction.

G. The actuator electrical enclosure shall meet or exceed IP-67 standard, be integral to the actuator and shall house the electrical controls, field connection power and control terminal strips, and a thermostatically controlled space heater to prevent condensation.

H. Terminal strips shall accept bare wire as well as wires terminated with crimp on lugs.

I. Provide control power transformer with primary and secondary protection.

J. Actuators must be fully electrically repairable in the field, at least to the board level, using standard hand tools and not require return to the factory for repair.

2.4 CONTROLS

A. As a minimum, each actuator shall provide dry contact outputs capable of conveying the following data to a master control system. Contracts shall be compatible with a 120 VAC PLC digital input circuit.

1. Valve in full open position.

2. Valve in full closed position.

3. Selector switch in the Remote position.

B. The actuator shall be capable of providing a 4-20 ma DC output signal indicating the valve position.

C. Integral lockable three-position selector switch for Local - Off - Remote control.

D. Integral open-close pushbutton(s) and indicator lights.

E. Valve position shall be mechanically monitored so that if all power is removed from the actuator, the valve position manually changed and power restored the electronics will automatically detect the new valve position.

F. With the exception of limit and torque switch settings during setup, configuration of the actuator shall not require any removal of wires, covers, etc.

2.5 SPARE PARTS

A. Furnish manufacturers' recommended spare parts kits to accommodate two (2) actuators.

2.6 MANUFACTURERS

A. Limitorque L120 Series, Rotork CK Series, Beck, or equal.

PART 3 EXECUTION

3.1 PREPARATION:

A. Verify that systems are ready to receive work.

B. During installation of all actuators the CONTRACTOR shall verify that all items are clean and free of defects in material and workmanship and function properly.

3.2 INSTALLATION:

A. Install all actuators and appurtenances in accordance with the manufacturer's instructions.

B. Install all actuators so that operating handwheel, local push buttons and controls may be conveniently accessed from operating floor without interference, and as approved by the ENGINEER.

C. Actuator(s) shall be installed free from distortion; strain or raking caused by misaligned piping, equipment, or supports.

3.3 SERVICES OF THE MANUFACTURER:

A. The CONTRACTOR shall provide on-site startup and commissioning services of a factory trained service person to inspect the installation prior to placing any unit in service, to supervise the initial operation, and to instruct the OWNER in the proper operation, care, and maintenance of the equipment.

B. The CONTRACTOR shall provide factory service personnel for site visits for the purpose of commissioning the actuators. The CONTRACTOR must coordinate all trips in advance with the OWNER.

3.4 FIELD TESTS AND ADJUSTMENTS:

A. Factory Authorized Service Personnel shall conduct tests of each valve/actuator assembly, in both manual and automatic modes, in the presence of the ENGINEER to demonstrate that each unit and all associated components function properly under all possible field conditions.

B. The CONTRACTOR shall furnish any required test equipment and/or commissioning consumables.

C. The CONTRACTOR shall adjust all parts and components as required to provide correct operation.

3.5 TRAINING:

A. The CONTRACTOR shall provide a factory-trained technician to conduct two 4-hour training sessions for up to four of the OWNER's personnel per session. This session will be conducted at the designated site of the OWNER and shall consist of instruction on the proper operation and maintenance of the valve/actuator assembly.

B. The CONTRACTOR shall furnish all instruction materials (one per OWNER personnel plus additional two spares) to conduct the session. Upon completion of the training, all instructional materials shall become the property of the OWNER.

C. The sessions shall be conducted at times chosen by the OWNER.

D. One (1) additional day of service, separate from installation and start-up shall be provided for training. Training shall include a detailed Power Point presentation and an outline of the training, an electronic copy of which shall be turned over to the OWNER.

END OF SECTION

SECTION 15140

TESTING AND DISINFECTION

PART 1 GENERAL

1.1 DESCRIPTION

A. Work Specified

1. Testing and disinfection of all pressure piping for leakage as specified.

   a. The CONTRACTOR shall furnish all labor, equipment, test connections, vents, water and materials necessary for carrying out the pressure and leakage tests as specified and required.

   b. The work specified shall include all labor, material, equipment, services and incidentals necessary to fill, clean, chlorinate, flush, and test all pipelines, which will carry or hold potable water.

B. Related Work Specified Elsewhere

1. Section 11304 – Horizontal Split Case Pumps

2. Division 15 Specifications

C. Description

1. Permission shall be obtained from the OWNER of the water system before the use of water from any existing system. The CONTRACTOR shall:

   a. Conform to the requirements of the OWNER.

   b. Pay all costs connected with the taking or use of water for any retesting.

   c. The CONTRACTOR shall provide written notice to the OWNER and ENGINEER at least three working days in advance of testing and disinfection.

2. All work under this section shall be performed in the presence of the ENGINEER. A representative of the public health authority having jurisdiction must also be present, as required.

1.2 QUALITY ASSURANCE

A. Reference Standards

1. AWWA B300, Standard for Hypochlorites

2. AWWA B301, Standard for Liquid Chlorine

3. AWWA C104, Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water

4. AWWA C502, Standard for Dry-Barrel Fire Hydrants

5. AWWA C504, Standard for Rubber Seated Butterfly Valves

6. AWWA C600, Standard for Installation of Ductile Iron Watermains and Their Construction

7. AWWA C651, Standard for Disinfecting Water Mains

8. NSF/ANSI Standard 60 and 61 (as applicable)

9. Standard Methods for the Examination of Water and Wastewater, latest edition

10. 1996 Safe Drinking Water Act

1.3 SUBMITTALS

A. The CONTRACTOR shall submit proposed materials, methods, and operations regarding testing and disinfection to the ENGINEER for review prior to the start of testing.

B. CONTRACTOR must provide a sketch to the ENGINEER of the sampling locations identifying at minimum the following:

1. Street names

2. North arrow

3. Sampling locations

4. House numbers of nearest buildings to sampling locations

5. Other distinguishable landmarks

6. Any other information as requested by ENGINEER, OWNER, or County Health Department

C. The CONTRACTOR shall submit certification that all backflow preventers (Reduced Pressure Zone attachments) and pressure gauges have been tested and certified within the last year.

PART 2 PRODUCTS

2.1 MATERIALS

A. All products must be suitable for use in a potable water system and NSF-60 certified. All piping, valves, etc. shall be NSF-61 certified.

B. Chlorination shall be by the use of a solution of sodium hypochlorite contained in the pipe or structure as specified. The use of calcium hypochlorite in powdered, granular, or tablet form, shall not be allowed.

PART 3 EXECUTION

3.1 TESTS ON PRESSURE PIPING

A. General

1. Flush and disinfect prior to connection to existing piping as specified below, except as otherwise authorized by the ENGINEER.

2. Notify the ENGINEER 72 hours in advance of testing.

3. Equipment in or attached to the pipes being tested shall be protected. Any damage to such equipment during the test shall be repaired by the CONTRACTOR at his expense.

4. Conduct all tests per AWWA C-600 and C-651, latest editions in the presence of the ENGINEER. Repeat tests in the presence of local authorities having jurisdiction if required by them.

5. Test pressure requirements: 150 psi on all potable water piping systems (fittings and valves), 85 psi on all sump and drain systems (fittings and valves), and 150 psi on all instrument water piping systems (fittings and valves).

6. CONTRACTOR shall have sufficient personnel at the site for the entire duration of all tests.

7. Provide outlets to flush line, expel air and perform specified tests.

8. Where connections to existing lines are called for only one such connection will be allowed.

9. All fittings and appurtenances must be properly braced and harnessed before the pressure is applied. Thrust restraining devices, which will become a part of the system, must also be tested at the test pressure.

10. The CONTRACTOR must supply all materials and manpower to perform the tests as specified herein.

11. Testing and disinfection shall be acceptable and approved by the agency of jurisdiction before another connection is made.

B. Initial Flushing

1. CONTRACTOR shall fill and flush new pipe to remove dirt and miscellaneous debris from the inside of the pipe.

2. CONTRACTOR is responsible for removing all entrapped air during flushing.

3. Flushing must have sufficient flowrate to achieve a fluid velocity of 3.0 feet per second inside the pipe.

4. A minimum 2-inch tap is required for proper flushing of all pipe having a diameter of 8 inches or less.

5. Refer to AWWA C651, for number of taps required to obtain the minimum 3.0 feet per second flow velocity in all pipes larger.

6. CONTRACTOR is responsible for providing a water source for flushing. With the permission of the OWNER/OPERATOR, an existing watermain may be used as a water source; however, the following restrictions apply:

   a. The CONTRACTOR is not allowed to operate any valves or hydrants or operate any components, which belong to the OWNER.

   b. If water is drawn from the existing system, an appropriate backwater preventer such as a Reduced-Pressure Zone (RPZ) device must be used. The RPZ must be tested within one (1) year and approved prior to usage.

   c. The CONTRACTOR shall ascertain from the OPERATOR whether the volume of water to be used dictates the need for metering to be performed and usage documented.

d. Water from flushing procedures must be disposed of properly. Water may be piped or gravity-fed to an existing storm sewer with the ENGINEER's and the OWNER/OPERATOR's permission if proper erosion control methods to minimize sediment build-up are used. Discharge of water into a roadway or parking lot area is strictly prohibited. Water discharging operations shall not cause damage to any public or private property

7. CONTRACTOR shall partially open and close valves and hydrants several times under expected line pressure to flush foreign material out of the valves and hydrants.

3.2 LEAKAGE TEST

A. Each valve and all flanged and/or restrained joints shall be deemed leak-free by the ENGINEER prior to acceptance.

3.3 DISINFECTION

A. Before disinfection, the line shall be cleaned and flushed with clean water as defined in the Initial Flushing section. CONTRACTOR shall provide outlets as required.

B. The placement of chlorine powder or tablets inside the pipe during installation as a means of disinfection will not be allowed.

C. When incorporating a new pump, valve, or pipe into the water system, those components shall be chlorinated by a concentrated chlorine solution containing between 200 mg/l and 300 mg/l of free chlorine. The solution shall be applied with a brush or sprayed on the entire inner surface of the empty pipes or structures. The surfaces disinfected shall remain in contact with the strong chlorine solution for at least 30 minutes.

D. Bacteriological testing shall be performed by certified testing laboratory retained and paid for by CONTRACTOR. Results of bacteriological testing shall indicate conformance with the Contract Documents and shall be acceptable to the Authority and Department of Health.

3.4 FINAL FLUSHING

A. After disinfection, the line shall be flushed with clean water as defined in Initial Flushing section.

3.5 DISINFECTION OF HYDRAULIC STRUCTURES (TANK)

A. All interior surfaces of hydraulic structures shall be chlorinated and disinfected by CONTRACTOR in accordance with Method 2 in AWWA C652, and as accepted and approved by the Authority and Department of Health.

B. Disinfection:

1. Provide temporary taps, plugs, valves, drains, pumps, tanks, piping, facilities, and connections required to disinfect, dechlorinate, and remove chlorinated water, as necessary.

2. Disinfect hydraulic structures immediately before each structure is placed back into continuous operation to prevent facility from becoming contaminated after disinfection.

3. Do not discharge chlorinated water onto roadways, into ditches, storm sewers, drainage culverts, streams, or wetlands.

C. After disinfection is completed and before hydraulic structure is placed in continuous service, CONTRACTOR shall coordinate and pay for testing the hydraulic structure's water for coliform bacteria and chlorine residual in accordance to the latest version of "Standard Methods for Examination of Water and Wastewater" and as approved by the OWNER, ENGINEER and local Department of Health.

D. Samples for bacteriological testing shall be obtained from each disinfected hydraulic structure in accordance with AWWA C652, the latest version of "Standard Methods for Examination of Water and Wastewater" and as approved by the OWNER, ENGINEER and local Department of Health.

E. Repeat the disinfection procedure at no additional cost to OWNER, including water use, until test results indicate satisfactory results and tank is approved by the Department of Health to be put back into continuous service.

END OF SECTION

SECTION 15094

PIPE HANGERS AND SUPPORTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe supports, brackets, anchors, and appurtenances including miscellaneous fittings, adapters, struts, and plates not specifically included under other sections of the specifications.

B. In general, all required stainless steel pipe supports are not detailed on the Contract Drawings but shall be supplied and installed as specified herein.

1.2 RELATED SECTIONS

A. Division 15 – Mechanical

1.2 REFERENCES

A. Regulatory Requirements:

1. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:

a. The recommendations of the Cast Iron Soil Pipe's Institute's (CISPI) Cast Iron Soil Pipe and Fittings Handbook.

b. The Manufacturers Standardization Society of the Valve and Fittings Industry (MSS).

c. ANSI B31 – Standards of Pressure Piping.

1.3 SUBMITTALS

A. Shop Drawings:

1. CONTRACTOR shall submit for approval detailed Shop Drawings showing all hangers, supports and anchors.

2. Shop Drawings shall show location, installation, size, weight, material, fabrication details, loads or forces, and deflection of all supports.

3. Details of trapeze hangers and upper hanger attachments for piping 4 inches in diameter and over. Include the number and size of pipe lines to be supported on each type of trapeze hanger.

4. Details and method of installing sway braces for cast iron soil pipe.

5. Details and method of installing restraints, anchors, and supports for grooved end piping systems

B. Manufacturer's Literature: CONTRACTOR shall submit to the ENGINEER, manufacturer's catalog, literature and engineering data on all hangers and supports. Load ratings, materials and installation shall be consistent with the recommendations of MSS.

PART 2 PRODUCTS

2.1 GENERAL

A. Each piping system shall be analyzed for all loads and forces on the hangers and supports, and their reaction forces to the structure to which they are fastened.

B. Provide supports of adequate size and strength to support the weight of pipe, fittings, specials, valves, accessories and liquid and any anticipated thrust.

C. Each piping system shall be analyzed for all loads and forces on the hangers and supports, and their reaction forces to the structure to which they are fastened.

D. All supports, brackets, inserts, rods, bolts, nuts and accessories shall be of Type 316 stainless steel.

2.2 HANGERS AND SUPPORTS

A. Manufacturer - Manufactured hangers and supports:

1. Grinnell Co., Inc.

2. B-Line Systems, Inc.

3. Or equal.

B. All supports shall be capable of adjustment after placement of piping.

C. Pipe saddles shall be provided where required to protect the pipe covering. Supports shall be made so as to fit the outside diameter of the pipe plus the saddle.

D. Prevent contact between dissimilar metals when supporting copper tubing by use of solid copper, rubber, vinyl coated hangers or supports.

E. Hangers for pipe 2 inches in diameter and smaller shall be split ring type and for pipe larger than 2 inches in diameter shall be the clevis type.

F. Split ring type hangers and clevis type shall be stainless steel, except as specified otherwise herein.

G. Pipes with centerlines less than 24 inches from a wall may be supported by a typical wall support bracket.

H. Pipes with centerlines less than 6 feet above a floor shall be supported from below. All other pipes shall be hung from above, unless otherwise shown or specified.

I. Pipe support spacing shall be as defined in Part 3 of this specification.

J. Pipe supported from underneath shall be adjustable stainless steel pipe saddle supports on properly sized stanchions.

K. Hangers suspended from structural steel shall be supported by forged steel beam clamps with forged steel upper nuts and tie rods to lock clamps in place. Hangers suspended from pre-cast concrete shall be of type acceptable to the pre-cast concrete manufacturer. All hangers shall be galvanized plated.

L. Pipe Hangers: Height adjustable standard duty clevis type, with cross bolt and nut. Pipe spreaders or spacers shall be used on cross bolts of clevis hangers, when supporting piping 10 inches in size and larger.

2.3 ANCHORS AND ATTACHMENTS

A. Sleeve Anchors (Group II, Type 3, Class 3): Molly's Div./USM Corp. Parasleeve Series, Ramset's Dynabolt Series, or Red Head/Phillips AN, HN, or FS Series.

B. Wedge Anchors (Group II, Type 4, Class 1): Hilti's Kwik Bolt Series, USM Corp., or approved equal.

C. Non-Drilling Anchors (Group VIII, Type 1): Hilti's HDI Series, USM Corp., or approved equal.

D. Stud Anchors (Group VIII, Type 2): Red Head/Phillips JS Series, USM Corp., or approved equal.

E. Wedge Type Concrete Insert: Galvanized box-type ferrous castings, designed to accept 3/4-inch diameter bolts having special wedge shaped heads.

F. Beam Clamps: Forged steel beam clamp, with weldless eye nut (right hand thread), steel tie rod, nuts, and washers, Grinnell's Fig No. 292 (size for load, beam flange width, and rod size required).

G. Supports shall be furnished complete with necessary inserts, anchors, bolts, nuts, rods, washers, and other accessories.

2.4 FASTENERS

A. Bolts, Nuts, Washers, Lags, and Screws: Type 316 stainless steel; size and type to suit application.

2.5 ACCESSORIES

A. Hanger Rods

1. Hanger rods shall be solid and made of Type 316 stainless steel. Fully threaded or threaded at each end, with two nuts at each end for positioning rod and hanger, and locking each in place.

2. All hanger rods are subject to approval by the ENGINEER.

B. Adjustable Floor Rests and Base Flanges – Type 316 stainless steel.

C. Riser Clamps -Stainless steel.

2.6 SHOP PAINTING AND PLATING

A. Hangers, supports, rods, inserts and accessories used for pipe supports, unless chromium-plated, cadmium-plated, stainless steel or galvanized shall be shop-coated with metal primer paint. Electroplated copper hanger rods, hangers and accessories may be used with copper pipe or copper tubing.

B. Fabricated and manufactured supports and brackets shall be painted as defined in Section 09900 – General Painting, unless otherwise specified.

PART 3 EXECUTION

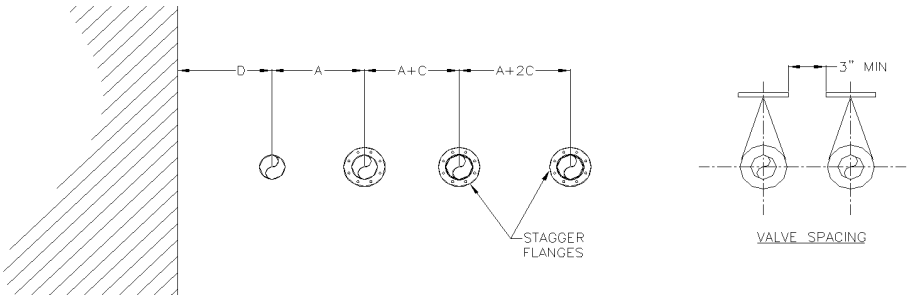
3.1 INSTALLATION

A. Install supports and accessories for piping systems in strict accordance with manufacturer's instructions.

B. Supports and accessories improperly installed shall be removed and replaced by the CONTRACTOR at his expense.

C. Do not hang or support one pipe from another, from ductwork, or from conduit.

D. Run piping in-groups at same location and elevation where practicable and generally parallel to building walls. Pipe spacing on support shall be as defined on the following table, unless otherwise specified by the manufacturer or noted on the Contract Drawings.



STANDARD PIPE SPACING UNISULATED PIPE DIM 'A'															ADDITIONAL SPACE TO ADD FOR INSUL. 'C'	
Pipe Size	1"	1 ½"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	STD.	D.STD
24"	21"	21"	21"	22"	22"	24"	25"	26"	27"	27"	28"	29"	30"	24"	1"	2"
20"	18"	18"	19"	19"	20"	21"	22"	23"	24"	24"	25"	26"	28"		1"	2"
18"	17"	17"	17"	18"	18"	20"	21"	22"	23"	23"	24"	25"			1"	3"
16"	16"	16"	16"	17"	17"	18"	19"	20"	21"	2"	23"				1"	3"
14"	14"	15"	15"	15"	16"	17"	18"	19"	20"	21"					2"	3"
12"	13"	13"	14"	14"	15"	16"	17"	18"	19"						2"	3"
10"	12"	12"	12"	13"	13"	14"	15"	16"							2"	3"
8"	10"	11"	11"	11"	12"	13"	14"								2"	3"
6"	9"	9"	10"	10"	11"	12"									2"	3"
4"	8"	8"	9"	9"	10"										2"	3"
3"	7"	7"	8"	8"											2"	3"
2"	6"	7"	7"												2"	3"
1-1/2"	6"	6"													2"	3"
1	5"														2"	3"
	5"	6"	6"	7"	7"	9"	10"	11"	13"	14"	15"	16"	18"	20"		
	CLEARANCE 'D'															

E. Support spacing shall be in accordance with ANSI B31.1. Space supports for horizontal piping generally as defined in the following schedules, except as otherwise specified by the manufacturer, or noted on the Contract Drawings.

1. For Weld/Threaded Steel, Alloy Steel, Threaded Brass Pipe and Fibrous Glass Reinforced Plastic Pipe (FRP):

PIPE SIZE (Inches)	MAXIMUM SPACING (Feet)
1 and under	8
1-1/4 and 1-1/2	9
2	10
2-1/2 and 10	12
10 and up	20

2. For Grooved End Steel Pipe (Rigid System):

PIPE SIZE (Inches)	MAXIMUM SPACING (Feet)
1-1/2 and under	7
2 through 4	10
5 and over	12

Notes:
- No pipe length shall be left unsupported between any two coupling joints.
- Support spacing shall be reduced as required for flexible system.

3. For Copper Tubing:

PIPE OR TUBING SIZE (Inches)	MAXIMUM SPACING (Feet)
1-1/2 and under	6
2 and over	10

4. For PVC and CPVC Piping:

PIPE OR TUBING SIZE (Inches)	MAXIMUM SPACING (Feet)
Under 1-inch	4
1 1/4 inch to 2 inch	5
2 1/2 inch to 6 inch	6
8 inch to 12 inch	8

Notes:
- Pipe spacing based on schedule 40 piping system operating at 100 degrees F.
- Spacing shall be modified as required for all other operating limits and pipe specification.

5. Cast Iron Soil Pipe

a. General

1) Where piping is suspended on centers in excess of 18 inches by means of non-rigid hangers, provide sway bracing to prevent horizontal pipe movement.

2) Additionally, brace piping 5 inches and larger to prevent horizontal movement and/or joint separation. Provide braces, blocks, rodding or other suitable method at each branch opening, or change of direction.

b. For Bell & Spigot Cast Iron Soil Pipe: Space hangers or support pipe at each joint or on maximum centers of 5 feet. Place hangers or supports as close as possible to joints and when hangers or supports do not come within 1-foot of a branch line fitting, install an additional hanger or support at the fitting.

c. For Hubless Cast Iron Soil Pipe: Space hangers or support pipe at each joint or on maximum centers of 5 feet. Place hanger or supports as close as possible to joints and when hangers or supports do not come within 1-foot of a branch line fitting, install an additional hanger or support at the fitting.

F. For Directional Changes: Install a hanger or support close to the point of change of direction of all pipe runs in either a horizontal or vertical plane.

G. For Concentrated Loads: Install additional hangers or supports, spaced as required and directed, at locations where concentrated loads such as in-line pumps, valves, fittings or accessories occur, to support the concentrated loads.

H. For Branch Piping Runs and Runouts Over 5 feet In Length: Install a minimum of one hanger, and additional hangers if required by the hanger spacing schedules.

I. Parallel Piping Runs: Where several pipe lines run parallel in the same plane and in close proximity to each other, trapeze hangers may be submitted for approval. Base hanger spacing for trapeze type hangers on the smallest size of pipe being supported. Design the entire hanger assembly based on a safety factor of five, for the ultimate strength of the material being used.

J. Support floor drain traps from the overhead construction, with hangers of type and design as required and approved. Overhead supports are not required for floor drain traps installed directly below earth supported concrete floors.

K. Size hanger rods in accordance with the following:

PIPE OR TUBING SIZE (Inches)	**SINGLE ROD HANGER SIZE (Inches)**		**DOUBLE ROD HANGER SIZE (Inches)**	
	PIPE	**TUBING**	**PIPE**	**TUBING**
1/2 to 2	3/8	3/8	3/8	3/8
2-1/2 and 3	1/2	3/8	3/8	3/8
4 and 5	5/8	1/2	1/2	3/8
6	3/4	1/2	5/8	1/2
8, 10 and 12	7/8	5/8	3/4	5/8

1. Size hanger rods, for piping over 12 inches in size and multiple line supports, based on a safety factor of five for the ultimate strength of the materials being used.

2. Secure hanger rods as follows: Install one nut under clevis, angle or steel member; one nut on top of clevis, angle or steel member; one nut inside insert or on top of upper hanger attachment and one nut and washer against insert or on lower side of upper hanger attachment. A total of four (4) nuts are required for each rod, two (2) at upper hanger attachment and two (2) at hanger.

L. Vertical Piping

1. Vertical piping shall be supported from below.

2. Support vertical risers of piping systems, by means of heavy-duty hangers installed close to base of pipe risers, and by riser clamps with extension arms at intermediate floors, with the distance between clamps not to exceed 25 feet, unless otherwise specified. Support pipe risers in vertical shafts equivalent to the aforementioned. Install riser clamps above floor slabs, with the extension arms resting on floor slabs. Provide adequate clearances for risers that are subject to appreciable expansion and contraction, caused by operating temperature ranges.

3. Support extension arms of riser clamps, secured to risers to be insulated for cold service, 4 inches above floor slabs, to allow room for insulating and vapor sealing around riser clamps.

4. Install intermediate supports between riser clamps on maximum 6-foot centers, for copper tubing risers 1-1/4 inch in size and smaller, installed in finished rooms or spaces other than mechanical equipment machine or steam service rooms, or penthouse mechanical equipment rooms.

5. Support cast iron risers, by means of heavy-duty hangers installed close to the base of the pipe risers, and 1/4 inch thick malleable iron or steel riser clamps with extension arms at each floor level, with the distance between clamps not to exceed 25 feet. Support cast iron risers in vertical shafts equivalent to the aforementioned.

6. Support hubless cast iron risers, by means of heavy-duty hangers installed close to the base of the pipe risers, and by malleable iron or steel riser clamps with the extension arms at each floor level, with the distance between clamps or intermediate supports not to exceed 12 feet. Support risers in vertical shafts equivalent to the aforementioned.

M. Floor Supports: Install adjustable yoke rests with base flanges, for the support of piping, unless otherwise indicated on the Drawings. Install supports in a manner, which will not be detrimental to the building structure.

N. Underground Cast Iron Pipe Supports: Firmly bed pipe laid underground, on solid ground along bottom of pipe. Install masonry piers for pipe laid in disturbed or excavated soil or where suitable bearing cannot be obtained. Support pipe, laid proximate to building walls in disturbed or excavated soil, or where suitable bearing cannot be obtained, by means of wall brackets or hold-fasts secured to walls in an approved manner.

3.2 UPPER HANGER ATTACHMENTS

A. General

1. In all cases, secure upper hanger attachments to overhead structural steel, steel bar joists, or other suitable structural members.

2. Do not attach hangers to steel decks that are not to receive concrete fill.

3. Do not attach hangers to precast concrete plank decks less than 2 3/4 inches thick.

4. Do not use flat bars or bent rods as upper hanger attachments.

B. Attachment to Steel Frame Construction: Provide intermediate structural steel members where required by pipe support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of five.

1. Do not use drive-on beam clamps.

2. Do not support piping over 4 inches in size from steel bar joists. Secure upper hanger attachments to steel bar joists at panel points of joists.

3. Do not drill holes in main structural steel members.

4. Beam clamps, with tie rods as specified, may be used as upper hanger attachments for the support of piping, subject to clamp manufacturer’s recommended limits.

C. Attachment to Concrete Filled Steel Decks

1. New Construction: Install metal deck ceiling bolts.

2. Existing Construction: Install welding studs (except at roof decks). Do not support a load in excess of 250 pounds from any single-welded stud.

3. Do not attach hangers to decks less than 2-1/2 inches thick.

D. Attachment to Cast-In-Place Concrete: Secure to overhead construction by means of cast-in-place concrete inserts.

E. Attachment to Existing Cast-In-Place Concrete

1. For piping up to a maximum of 4 inches in size, secure hangers to overhead construction with self-drilling type expansion shields and machine bolts.

2. Secure hangers to wall or floor construction with single unit expansion shields or self-drilling type expansion shields and machine bolts.

F. Attachment to Cored Precast Concrete Decks (Flexicore, Dox Plank, Spancrete, etc.): Toggle bolts may be installed in cells for the support of piping up to a maximum of 2-1/2 inches in size.

G. Attachment to Hollow Block or Hollow Tile Filled Concrete Decks

1. New Construction - Omit block or tile and pour solid concrete with cast-in-place inserts.

2. Existing Construction - Break out block or tile to access, and install machine bolt anchors at highest practical point on side of web.

H. Attachment to Waffle Type Concrete Decks

1. New Construction - Install cast-in-place inserts.

2. Existing Construction - Install machine bolt expansion anchors at highest practical point on side of web.

I. Attachment to Precast Concrete Tee Construction

1. New Construction -Tee hanger inserts between adjacent flanges, except at roof deck without concrete fill.

2. Existing Construction - Dual unit expansion shields in webs of tees. Install shields as high as possible in the webs.

a. Exercise extreme care in the field drilling of holes to avoid damage to reinforcing.

b. Do not use powder driven fasteners.

3.3 ANCHORS, RESTRAINTS, RIGID SUPPORTS, STAYS AND SWAY BRACES

A. Install pipe anchors, restraints and sway braces, at locations noted on the Drawings. Design anchors so as to permit piping to expand and contract freely in opposite directions, away from anchor points. Install anchors independent of all hangers and supports, and in a manner that will not affect the structural integrity of the building.

B. In grooved end piping systems, install restraints, anchors, and rigid supports as recommended by the manufacturer of the grooved end fittings to ensure proper support and alignment of the piping under operating and testing pressures (maximum hanger or support spacing shall be as previously specified).

1. Horizontal piping shall maintain a constant pitch without sags, humps, or lateral deflections.

2. Branch piping shall remain perpendicular to main piping and/or risers.

3. Vertical piping shall remain plumb without deflections.

4. Vertical piping shall be rigidly supported, or anchored at both top and bottom, and wherever necessary to prevent movement and/or shearing forces at branch connections.

C. Cast Iron Soil Piping Systems:

1. Where piping is suspended on centers in excess of 18 inches by means of non-rigid hangers, provide sway braces, of design, number and location in accordance with the Cast Iron Soil Pipe Institute's Cast Iron Soil Pipe and Fittings Handbook to prevent horizontal pipe movement.

2. Additionally, brace piping 5 inches and larger to prevent horizontal movement and/or joint separation. Provide braces, blocks, rodding or other suitable method at each branch opening, or change of direction in accordance with the Cast Iron Soil Pipe Institute's Cast Iron Soil Pipe and Fittings Handbook to prevent horizontal pipe movement.

END OF SECTION

SECTION 15170

PLUMBING PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Domestic water piping materials and fittings.
2. Sanitary piping materials and fittings.
3. Vent piping materials and fittings.
4. Roof drainage piping and fittings.

1.2 PERFORMANCE REQUIREMENTS

A. Provide all piping and materials listed in this section in compliance with New York State Uniform Building Code latest editions.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. System purging and disinfecting activities report.

C. Field quality-control reports.

1.4 FIELD CONDITIONS

A. Interruption of plumbing systems: Do not interrupt any existing plumbing system serving a facility occupied by an Owner or others unless prior written approval has been obtained. Follow all owner requirements and shutdown procedures.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 PRODUCTS

2.1 FIRESTOPPING SYSTEM

A. Materials for firestopping seals shall be listed by an approved independent testing laboratory for “Through-Penetration Firestop Systems.” The system shall meet the ASTM E814 standard fire test standard.

B. Firestop system seals shall be provided at locations where piping passes through a fire rated wall, floor/ceiling, or ceiling/roof assembly.

C. Minimum required fire resistant ratings of the assembly shall be maintained by the Firestop System. Installation shall conform to the manufacturer's recommendations and other requirements necessary to meet the testing laboratory's listing for the specific installation.

2.2 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Comply with NSF/ANSI 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

C. Comply with NSF Standard 372 for low lead, NSF 61 and 62 for all potable domestic water piping.

D. Piping materials shall bear label, stamp, or other markings of specified testing agency.

2.3 COPPER TUBE AND FITTINGS

A. Hard Copper Tube (above slab): ASTM B 88, Type L and K water tube, drawn temper.

B. Soft Copper Tube (below slab): ASTM B 88, Type K water tube, annealed temper.

C. Copper Type DWV Tube: ASTM B 306, drainage tube, drawn temper.
   1. Copper piping is prohibited for urinal waste.

D. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

E. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

F. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

G. Copper Unions:

   1. MSS SP-123.
   2. Cast-copper-alloy, hexagonal-stock body.
   3. Ball-and-socket, metal-to-metal seating surfaces.
   4. Solder-joint or threaded ends.

H. Copper Pressure-Seal-Joint Fittings:

   1. Fittings for NPS 2 and Smaller: Wrought-copper fitting with EPDM-rubber, O-ring seal in each end.
   2. Fittings for NPS 2-1/2 to NPS 4: Cast-bronze or wrought-copper fitting with EPDM-rubber, O-ring seal in each end.

2.4 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: Schedule 40, ASTM D 2665, drain, waste, and vent.

B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste and vent patterns to fit Schedule 40 pipe.

2.5 CAST IRON PIPE AND FITTINGS

A. Cast Iron Soil Pipe and Fittings - Shall conform to the standards of the Cast Iron Soil Pipe Institute (CISPI) Specification HS-82, ASTM A74 and ANSI A112.5.1 for hub and spigot pipe or CISPI 301 and ASTM A888 for no-hub pipe. Pipe class shall be as stated in the piping schedule.

B. Hub and Spigot Joints - Compression gaskets for hub and spigot joints shall be neoprene type acceptable for below-grade installation. Install per manufacturer's recommendations.

C. No-Hub Joints - Fittings and all parts of the clamp assembly used in jointing "hubless cast iron sanitary systems" for soil, waste, vent and house of building sewer lines shall bear the registered insignia C or C No Hub indicating that these items used in the sanitary system comply with the Cast Iron Soil Piping Institute Standard 310-69T and ASTM C564.

2.6 PIPING JOINING MATERIALS

A. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

B. Solder Filler Metals: ASTM B 32, lead-free alloys.

C. Flux: ASTM B 813, water flushable.

D. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

E. Joint Compound and Tape: Suitable for application.

F. PVC: solvent weld

2.7 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Transition Couplings:

1. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
2. Unshielded, Non-pressure Transition Couplings:

    a. Standard: ASTM C 1173.
    b. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
    c. End Connections: Same size as and compatible with pipes to be joined.
    d. Sleeve Materials:

        1) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
        2) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

3. Shielded, Non-pressure Transition Couplings:

a. Standard: ASTM C 1460.
b. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
c. End Connections: Same size as and compatible with pipes to be joined.

C. Copper to Steel Pipe: Cast bronze copper to iron female or male adapter with shoulder for drainage piping only. Dielectric pipe fittings.

D. Copper to Cast Iron Pipe: Cast bronze, cast iron to sweat adapter.

E. Plastic-to-Metal Transition Unions:

1. Description:
a. Brass threaded end.
b. Solvent-cement-joint or threaded plastic end.
c. Rubber O-ring.
d. Union nut.

2.8 CLEANOUTS

A. Cleanouts shall be installed where indicated on the Contract Drawings and at the base of all stacks, on all traps, at all points where the direction of flow changes and where the distance from the previous cleanout exceeds 50 feet. The interior of each system must be accessible throughout.

B. Cleanouts shall be as manufactured by Jay R. Smith, Josam Manufacturing Company, or equal.

C. All cleanout plugs in screwed facilities shall be solid cast brass of the screwed type. Cleanout plugs shall be the full size of the pipe up to 4 inches and shall be 4 inches for larger pipes. Cleanout plugs shall be Jay R. Smith, Josam Manufacturing Company, or equal.

D. All cleanouts in finished floors shall be constructed of galvanized cast iron body, round adjustable top with inside outlet, round top, heavy duty screwed-down bronze cover, bronze "T" handle closure plug, and shall be Jay R. Smith, Josam Manufacturing Company, or equal.

E. All PVC cleanouts shall be as manufactured by Plastic Oddities, Inc.; Zurn; or equal. Provide PVC cleanouts and heavy-duty access cover at locations as shown on the Contract Drawings.

2.9 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

PART 3 EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 07 84 13 "Penetration Firestopping."

C. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

D. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.

1. Tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
2. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.

    a. Straight tees, elbows, and crosses may be used on vent lines.

3. Do not change direction of flow more than 90 degrees.
4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.

    a. Reducing size of piping in direction of flow is prohibited.

E. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Waste: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Sanitary Waste Piping: 1 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

F. Install shutoff valve immediately upstream of each dielectric fitting.

G. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

H. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

I. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

J. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

K. Install piping to permit valve servicing.

L. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

M. Install piping free of sags and bends.

N. Install fittings for changes in direction and branch connections.

O. Install piping to allow application of insulation.

P. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

Q. Install sleeves for piping penetrations of walls, ceilings, and floors.

R. Install sleeve seals for piping penetrations of concrete walls and slabs.

S. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

T. Install escutcheons for piping penetrations of walls, ceilings, and floors.

U. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

V. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

W. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

3.2 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

3.3 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Waste Drainage Piping:

1. Install transition couplings at joints of piping with small differences in OD’s
2. Provided Shielded non-pressure transition couplings.

3.4 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger, support products, and installation in Section 15094 "Pipe Hangers and Supports."

B. Support piping and tubing not listed in according to MSS SP-58 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
2. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
3. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.7 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 15075 "Piping Identification."

B. Label pressure piping with system operating pressure.

3.8 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

   a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
   b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

      1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
      2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

   c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
   d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Domestic Water Piping Tests:

    a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
    b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
    c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
    d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
    e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
    f. Prepare reports for tests and for corrective action required.

3. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:

    a. Fill sewer piping with water. Test with pressure of at least 10-foot head of water, and maintain such pressure without leakage for at least 15 minutes.
    b. Close openings in system and fill with water.
    c. Purge air and refill with water.
    d. Disconnect water supply.
    e. Test and inspect joints for leaks.

B. Piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.9 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

    a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
    b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.10 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Repeat procedures if biological examination shows contamination.
    e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.11 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges may be used for aboveground piping joints unless otherwise indicated.

Service	Pipe Materials	Fittings	Connections
Process Water, Domestic water hot, cold	Type L copper	Wrought copper	No-lead solder
Domestic water interior/hot, cold (Below Slab)	Type K copper, soft temper	Wrought Copper	No-lead solder
Sanitary, vent and storm (Above Slab)	DWV Type PVC	PVC	Solvent Welded.
Roof Drainage Piping (Above Slab)	Cast Iron DWV Service Weight	Cast Iron	No-hub
Roof Drainage Piping (Below or Cast in at Slab)	Cast Iron DWV Service Weight	Cast Iron	Hub and Sipgot

END OF SECTION

SECTION 15260

PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

C. Removable valve and fitting jackets.

D. Hanger inserts.

1.2 RELATED SECTIONS

A. Section 01331 - Shop Drawing Procedures

B. Section 01620 - Equipment-General

C. Section 01630 – Substitutions

D. Section 09900 – Painting

E. Section 15110 - Valves And Appurtenances

F. Section 15150 – Pipe Supports and Hangers

1.3 REFERENCES

A. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate

B. ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus

C. ASTM C195 - Mineral Fiber Thermal Insulation Cement

D. ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation

E. ASTM C449 - Mineral Fiber Hydraulic-setting Thermal Insulating and Finishing Cement

F. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

G. ASTM C533 - Calcium Silicate Block and Pipe Thermal Insulation

H. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form

I. ASTM C547 - Mineral Fiber Preformed Pipe Insulation

J. ASTM C552 - Cellular Glass Block and Pipe Thermal Insulation

K. ASTM C585 - Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System)

L. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation

M. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber

N. ASTM D1667 - Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Closed Cell Foam)

O. ASTM D2842 - Water Absorption of Rigid Cellular Plastics

P. ASTM E84 - Surface Burning Characteristics of Building Materials

Q. ASTM E96 - Water Vapor Transmission of Materials

R. NFPA 255 - Surface Burning Characteristics of Building Materials

S. ASHRAE/IESNA 90.1 - Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings

T. National Commercial and Industrial Insulation Standards (Third Edition)

U. UL 723 - Surface Burning Characteristics of Building Materials

V. Mechanical Code of New York State (latest edition)

W. Plumbing Code of New York State (latest edition)

X. Energy Conservation Construction Code of New York State (latest edition)

1.4 SUBMITTALS

A. Submit under provisions of Section 01331.

B. Product Data - Provide product description, list of materials and thickness for each service, and locations. Submit catalog information on valve and fitting covers.

C. Manufacturer's Installation Instructions - Indicate procedures which ensure acceptable workmanship and installation standards will be achieved.

1.5 QUALITY ASSURANCE

A. Materials - Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84.

1.6 QUALIFICATIONS

A. Applicator - Company specializing in performing the work of this section with minimum five years' experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products under provisions of Section 01620.

B. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

C. Store insulation in original wrapping and protect from weather and construction traffic.

D. Protect insulation against dirt, water, chemical, and mechanical damage.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.1 GLASS FIBER

A. Manufacturers
   1. Manville - Model Micro-Lok.
   2. Other acceptable manufacturers offering equivalent products.
      a. Owens Corning - Model ASJ/SSL-II.
      b. Knauf - Model ASJ/SSL.
      c. CertainTeed - Model Snap On.
   3. Substitutions - Refer to Section 01630.

B. Insulation - ASTM C547; rigid molded, noncombustible.
   1. "K" ("ksi") Value - ASTM C335, 0.24 at 75 degrees F.
   2. Minimum Service Temperature - -20 degrees F.
   3. Maximum Service Temperature - 100 degrees F.
   4. Maximum Moisture Absorption - 0.2 percent by volume.
   5. Maximum Flame Spread – ASTM E84; 25.
   6. Maximum Smoke Developed – ATM E84; 50.

C. Vapor Barrier Jacket
   1. ASTM C921, white Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Transmission - ASTM E96; 0.02 perm inches.
   3. Secure with self-sealing longitudinal laps and butt strips.
   4. Secure with outward clinch expanding staples and vapor barrier mastic.

D. Tie Wire - 18-gage stainless steel with twisted ends on maximum 12-inch centers.

E. Vapor Barrier Lap Adhesive - Compatible with insulation or integral lap adhesive.

F. Insulating Cement/Mastic - ASTM C195; hydraulic setting on mineral wool.

G. Fibrous Glass Fabric
   1. Cloth - Untreated; 9 oz/sq.yd. weight.
   2. Blanket - 1.0 lb/cu.ft. density.

H. Indoor Vapor Barrier Finish - Vinyl emulsion type acrylic, compatible with insulation, white color.

I. Insulating Cement - ASTM C449.

2.4 JACKETS

A. PVC Plastic
   1. Manufacturers
      a. Manville - Model Zeston.
      b. Knauf - Model Proto.
      c. Or equal.
   2. Jacket - ASTM C921, One-piece molded-type fitting covers and sheet material, off white color.
      a. Minimum Service Temperature - -40 degrees F.
      b. Maximum Service Temperature - 150 degrees F.
      c. Moisture Vapor Transmission - ASTM E96; 0.002 perm inches.
      d. Maximum Flame Spread - ASTM E84; 25.
      e. Maximum Smoke Developed - ASTM E84; 50.
      f. Minimum Thickness - 20 mil.
      g. Connections - Brush-on welding adhesive or pressure-sensitive color matching vinyl tape.
   3. Covering Adhesive Mastic - Compatible with insulation.

2.5 HANGER INSERTS

A. For hot or cold piping systems 1-1/2 inches in diameter or larger, operating at nominal temperatures of 200 degrees F or less, inserts shall be high density such as ASTM C640 cork, hydrous calcium silicate insulation, wood, or foam with sufficient compressive strength to support the weight of the piping system.

B. At temperatures exceeding 200 degrees F, high temperature pipe insulation shall be used for high-density inserts.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

A. Install all piping insulation and jacketing in accordance with the Energy Conservation Construction Code of New York State, BOCA National Mechanical Code, National Commercial and Industrial Insulation Standards, International Mechanical Code, and Mechanical Code of New York State.

B. Install materials in accordance with manufacturer's instructions.

C. On exposed piping, locate insulation and cover seams in least visible locations.

D. Insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature.
   1. Provide vapor barrier jackets, factory applied or field applied.
   2. Insulate fittings and joints with molded insulation of like material and thickness as adjacent pipe.
   3. Finish with jackets listed.
   4. PVC fitting covers may be used.
   5. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.
   6. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, air separators, and expansion joints.

E. Inserts and Shields
   1. Application - All insulated piping 1-1/2 inches diameter or larger.
   2. Shields - Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert Location - Between support shield and piping and under the finish jacket.
   4. Insert Configuration - Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
   5. Insert Material - Insulating material suitable for the planned temperature range.

F. Finish insulation at supports, protrusions, and interruptions.

3.3 TOLERANCE

A. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

3.4 PAINTING

A. The insulation jacketing shall be color coded to correspond with the color of the piping and equipment in accordance with Section 09900.

B. Piping that is scheduled to be insulated will only receive preparation and a primer coating.

3.6 PIPING INSULATION SCHEDULE

A. Insulation Types
   1. Type 1 - Glass fiber.

B. Jacket Types
   1. Type A - PVC jacket.

C. Insulation Schedule - Provide insulation types and thickness as indicated below.

	Pipe Size (Inches)	**Insulation Type**	**Jacket Type**	**Insulation Thickness**
INSIDE PROCESS PIPING				
Guenther Pump Station Potable Water Exposed Process Piping	48, 42, 36, 24, 18, 12	1	A	3/4 inch minimum
PIPING SYSTEMS				
Domestic cold water	All	1	A	3/4 inch minimum(1)
Domestic hot water	All	1	A	1 inch minimum(1)

Note: (1) Or minimum thickness per NYS Uniform Code or ASHRAE 90.1, whichever is greater.

END OF SECTION

SECTION 15310

COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Mechanical sleeve seals.
3. Sleeves.
4. Escutcheons.
5. Equipment installation requirements common to equipment sections.
6. Painting and finishing.
7. Concrete bases.
8. Supports and anchorages.

1.3 DEFINITIONS

A. Exposed, Interior Installations - Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

B. Exposed, Exterior Installations - Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.4 SUBMITTALS

A. Product Data - For the following:

1. Mechanical sleeve seals.
2. Escutcheons.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."

B. Electrical Characteristics for Fire-Suppression Equipment - Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.6 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for fire-suppression installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 Articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers - Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE AND FITTINGS

A. Refer to individual Division 15 piping sections for pipe and fitting materials and joining methods.

B. Pipe Threads - ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 15 piping sections for special joining materials not listed below.

B. Pipe Flange Gasket Materials - Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

a. Full Face Type - For flat-face, Class 125, cast iron and cast bronze flanges.

b. Narrow Face Type - For raised-face, Class 250, cast iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated, and full face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts - ASME B18.2.1, carbon steel, unless otherwise indicated.

2.4 MECHANICAL SLEEVE SEALS

A. Description - Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

B. Manufacturers

1. Advance Products & Systems, Inc.

2. Calpico, Inc.

3. Metraflex Co.

4. Pipeline Seal and Insulator, Inc.

C. Sealing Elements - EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

D. Pressure Plates - Stainless steel. Include two for each sealing element.

E. Connecting Bolts and Nuts - Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.5 SLEEVES

A. Galvanized Steel Sheet - 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe - ASTM A53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Stack Sleeve Fittings - Manufactured, cast iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp - Clamping ring with setscrews.

2.6 ESCUTCHEONS

A. Description - Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. Split-Plate, Stamped Steel Type - With concealed hinge, set screw, and chrome-plated finish.

2.7 GROUT

A. Description - ASTM C1107, Grade B, non-shrink and non-metallic, dry hydraulic cement grout.

1. Characteristics - Post-hardening, volume adjusting, non-staining, non-corrosive, non-gaseous, and recommended for interior and exterior applications.

2. Design Mix - 5,000 psi, 28-day compressive strength.

3. Packaging - Premixed and factory packaged.

PART 3 EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 15 sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping to permit valve servicing.

E. Install piping at slopes necessary to achieve sufficient drainage.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Select system components with pressure rating equal to or greater than system operating pressure.

I. Sleeves are not required for core-drilled holes.

J. Permanent sleeves are not required for holes formed by removable PE sleeves.

K. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

L. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

    a. Exception - Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

    a. Steel Pipe Sleeves - For pipes smaller than NPS 6.

    b. Steel Sheet Sleeves - For pipes NPS 6 and larger, penetrating gypsum board partitions.

        1) Seal space outside of sleeve fittings with grout.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to 07900, Joint Sealers, for materials and installation.

M. Fire Barrier Penetrations - Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.

N. Verify final equipment locations for roughing-in.

O. Refer to equipment specifications in other sections of these specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 15 sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Threaded Joints - Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads - Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Flanged Joints - Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.3 PAINTING

A. Fire-suppression system piping, equipment, and components shall be painted red.

B. Damage and Touchup - Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.4 CONCRETE BASES

A. Concrete Bases - Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.

2. Install dowel rods connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.

3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base and anchor into structural concrete floor.

4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

5. Install anchor bolts to elevations required for proper attachment to supported equipment.

6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

7. Use 3,000 psi, 28-day compressive strength concrete and reinforcement as specified in Section 03300, Cast-in-Place Concrete.

3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGES

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire-suppression materials and equipment.

C. Field Welding - Comply with AWS D1.1.

END OF SECTION

SECTION 15325

DIGITAL ADDRESSABLE FIRE ALARM SYSTEM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

A. Section Includes

1. Fire alarm control unit.
2. Manual pull stations.
3. Carbon monoxide detectors.
4. Addressable interface device.
5. Notification appliances.

1.3 DEFINITIONS

A. EMT - Electrical Metallic Tubing.

B. FACP - Fire Alarm Control Panel.

C. NICET - National Institute for Certification in Engineering Technologies.

1.4 ACTION SUBMITTALS

A. Product Data - For each type of product, including furnished options and accessories.

1. Include construction details, material descriptions, dimensions, profiles, and finishes.
2. Include rated capacities, operating characteristics, and electrical characteristics.

B. Shop Drawings - For fire alarm system.

1. Comply with recommendations and requirements in the Documentation section of the Fundamentals chapter in NFPA 72.
2. Include plans, elevations, sections, details, and attachments to other work.

3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.

4. Detail assembly and support requirements.

5. Include voltage drop calculations for notification appliance circuits.

6. Include battery size calculations.

7. Include input/output matrix.

8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this specification and in NFPA 72.

9. Include performance parameters and installation details for each detector.

C. General Submittal Requirements

1. Submittals shall be approved by authorities having jurisdiction prior to commencement of work.

2. Shop drawings shall be prepared by persons with the following qualifications:

a. Trained and certified by manufacturer in fire alarm system design.

b. NICET-certified, fire alarm technician; Level III minimum.

c. Licensed or certified by authorities having jurisdiction.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data - For fire alarm systems and components to include in emergency, operation, and maintenance manuals.

1. Include the following and deliver copies to authorities having jurisdiction:

a. Comply with the Records section of the Inspection, Testing and Maintenance chapter in NFPA 72.

b. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.

c. Riser diagram.

d. Device addresses.

e. Provide Inspection and Testing Form according to the Inspection, Testing and Maintenance chapter in NFPA 72, and include the following:

1) Equipment tested.

2) Frequency of testing of installed components.

3) Frequency of inspection of installed components.

4) Requirements and recommendations related to results of maintenance.

5) Manufacturer's user training manuals.

f. Manufacturer's required maintenance related to system warranty requirements.

g. Abbreviated operating instructions for mounting at fire alarm control unit.

1.6 QUALITY ASSURANCE

A. Installer Qualifications - Personnel shall be trained and certified by manufacturer for installation of units required for this project.

B. Installer Qualifications - Installation shall be by personnel certified by NICET as fire alarm Level II technician.

1.7 WARRANTY

A. Special Warranty - Manufacturer agrees to repair or replace fire alarm system equipment and components that fail in materials or workmanship within specified warranty period.

1. Warranty Extent - All equipment and components not covered in the Maintenance Service Agreement.

2. Warranty Period - 5 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Non-coded, single loop, addressable system, with multiplexed signal transmission and horn/strobe evacuation.

B. Automatic sensitivity control of certain smoke detectors.

C. All components provided shall be listed for use with the selected system.

D. Electrical Components, Devices, and Accessories - Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire alarm signal initiation shall be by one or more of the following devices and systems:

1. Manual pull stations.

2. Smoke detectors.

3. Dry pipe sprinkler system water flow pressure switch.

B. Fire alarm signal shall initiate the following actions:

1. Continuously operate alarm notification appliances.

2. Identify alarm and specific initiating device at fire alarm control unit.

3. Transmit an alarm signal to the remote alarm receiving station.

4. Record events in the system memory.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Dry pipe sprinkler system valve tamper switch.

2. Dry pipe sprinkler system low/high air pressure switch.

3. Carbon monoxide detectors.

4. User disabling of zones or individual devices.

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.

2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.

3. Loss of communication with any addressable sensor, input module, relay, printer interface, or Ethernet module.

4. Loss of primary power at fire alarm control unit.

5. Ground or a single break in internal circuits of fire alarm control unit.

6. Abnormal ac voltage at fire alarm control unit.

7. Break in standby battery circuitry.

8. Failure of battery charging.

9. Abnormal position of any switch at fire alarm control unit or annunciator.

E. System Supervisory Signal Actions - Identify specific device initiating the event at fire alarm control unit and remote annunciators.

2.3 FIRE ALARM CONTROL UNIT

A. Manufacturers

1. JCI/Simplex.

2. Notifier.

3. Siemens.

4. Edwards.

5. Or approved equal.

B. General Requirements for Fire Alarm Control Unit

1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.

   a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.

   b. Include a real-time clock for time annotation of events on the event recorder and printer.

   c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.

   d. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.

2. Addressable Initiation Device Circuits - The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.

3. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment - The FACP shall be listed for releasing service.

C. Alphanumeric Display and System Controls - Arranged for interface between human operator at fire alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display - Liquid-crystal type, 80 characters, minimum.

2. Keypad - Arranged to permit entry and execution of programming, display, and control commands.

D. Initiating Device, Notification Appliance, and Signaling Line Circuits

1. Pathway Class Designations - NFPA 72, Class B.

2. Pathway Survivability - Level 0.

3. Install no more than 50 addressable devices on each signaling-line circuit.

E. Notification Appliance Circuit

1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.

2. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.

2.4 MANUAL FIRE ALARM BOXES

A. General Requirements for Manual Fire Alarm Boxes - Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

1. Double-action mechanism requiring two actions to initiate an alarm, pull lever type; with integral addressable module arranged to communicate manual station status (normal, alarm, or trouble) to fire alarm control unit.

2. Station Reset - Key- or wrench-operated switch.

2.5 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors

1. Comply with UL 268, operating at 24-V dc, nominal.

2. Detectors shall be four- or two-wire type.

3. Integral Addressable Module - Arranged to communicate detector status (normal, alarm, or trouble) to fire alarm control unit.

4. Base Mounting - Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.

5. Self-Restoring - Detectors do not require resetting or readjustment after actuation to restore them to normal operation.

6. Integral Visual-Indicating Light - LED type, indicating detector has operated and power on status.

B. Photoelectric Smoke Detectors

1. Detector address shall be accessible from fire alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.

2. An operator at fire alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

a. Primary status.

b. Device type.

c. Present average value.

d. Present sensitivity selected.

e. Sensor range (normal, dirty, etc.).

2.6 CARBON MONOXIDE DETECTORS

A. General Requirements for Carbon Monoxide Detectors:

1. Comply with UL 2075, operating at 24 V-dc, nominal.

2. Detector shall be four- or two-wire type.

3. Integral Addressable Module - Arranged to communicate detector status (normal, alarm, or trouble) to fire alarm control unit.

4. Base Mounting - Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.

5. Self-Restoring - Detectors do not require resetting or readjustment after actuation to restore them to normal operation.

6. Integral Visual-Indicating Light - LED type, indicating detector has operated and power on status.

7. Detector address shall be accessible from fire alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.

8. An operator at fire alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

a. Primary status.

b. Device type.

2.7 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances - Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

B. Combination Devices - Factory-integrated audible and visible devices in a single mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

C. Horns - Electric vibrating polarized type, 24-V dc, with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol.

D. Visible Notification Appliances - Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch-high letters on the lens.

1. Rated Light Output - 15/30/75/110 cd, selectable in the field.

2. Mounting - Wall mounted unless otherwise indicated.

3. Flashing shall be in a temporal pattern, synchronized with other units.

4. Strobe Leads - Factory connected to screw terminals.

5. Mounting Faceplate - Factory finished red.

2.8 CARBON MONOXIDE NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances - Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

B. Horns - Electric vibrating polarized type, 24-V dc, with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol.

2.9 EXTERIOR ELECTRIC WATERFLOW ALARM BELL

A. General Requirements: Shall be UL listed for fire protection use and shall operate at 24 V-dc.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.

B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT INSTALLATION

A. Comply with NFPA 72 and requirements of authorities having jurisdiction for installation and testing of fire alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, Fire Alarm Systems.

1. Devices placed in service before all other trades have completed cleanup shall be replaced.

2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.

B. Install wall-mounted equipment, with tops of cabinets not more than 78 inches above the finished floor.

C. Manual Fire Alarm Boxes

1. Install manual fire alarm box in the normal path of egress within 60 inches of the exit doorway.

2. Mount manual fire alarm box on a background of a contrasting color.

3. The operable part of manual fire alarm box shall be between 42 inches and 48 inches above floor level. All devices shall be mounted at the same height unless otherwise indicated.

D. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.

E. Audible Alarm Indicating Devices - Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.

F. Visible Alarm Indicating Devices - Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling. Install all devices at the same height unless otherwise indicated.

3.3 PATHWAYS

A. Pathways shall be installed in EMT.

B. Exposed EMT shall be painted red enamel.

3.4 CONNECTIONS

A. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Supervisory connections at valve supervisory switches.

2. Supervisory connections at low air pressure switch of dry pipe sprinkler system.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals.

B. Install framed instructions in a location visible from fire alarm control unit.

3.6 GROUNDING

A. Ground fire alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire alarm control unit.

B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.7 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by Construction Manager and authorities having jurisdiction.

B. Perform tests and inspections.

C. Perform the following tests and inspections:

1. Visual Inspection - Conduct visual inspection prior to testing.

a. Inspection shall be based on completed record Drawings and system documentation that is required by the Completion Documents, Preparation table in the Documentation section of the Fundamentals chapter in NFPA 72.

b. Comply with the Visual Inspection Frequencies table in the Inspection section of the Inspection, Testing and Maintenance chapter in NFPA 72; retain the Initial/Reacceptance column and list only the installed components.

2. System Testing - Comply with the Test Methods table in the Testing section of the Inspection, Testing and Maintenance chapter in NFPA 72.

3. Factory-authorized service representative shall prepare the Fire Alarm System Record of Completion in the Documentation section of the Fundamentals chapter in NFPA 72 and the Inspection and Testing Form in the Records section of the Inspection, Testing and Maintenance chapter in NFPA 72.

D. Reacceptance Testing - Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances until the Building obtains a Certificate of Occupancy.

E. Fire-alarm system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.8 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain fire alarm system.

END OF SECTION

SECTION 15326

WATER-BASED FIRE SUPPRESSION SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

A. This section includes the following fire suppression piping inside the building:

1. Dry pipe sprinkler systems.

1.3 SYSTEM DESCRIPTIONS

A. Dry Pipe Sprinkler System - Automatic sprinklers are attached to piping containing compressed air. Opening of sprinklers releases compressed air and permits water pressure to open dry pipe valve. Water then flows into piping and discharges from opened sprinklers.

B. Contractor shall perform flow test per NFPA 291 to verify available supply.

C. Sprinkler system shall be hydraulically calculated. Pipe sizes shown on drawings shall be maintained and used in calculations. Pipe sizes not shown shall be determined by calculations.

D. Maximum 20 fps system flow velocity and 15 fps in mains with paddle water flow detectors. Remote area dimension parallel to branch lines to be 1.4 times square root of hydraulic remote area.

E. Control valves shall be electrically supervised and locked in proper position.

1.4 PERFORMANCE REQUIREMENTS

A. Standard Piping System Component Working Pressure - Listed for at least 175 psig.

B. Fire suppression sprinkler system design shall be approved by authorities having jurisdiction.

1. Margin of Safety for Available Water Flow and Pressure - 10 psi, including losses through water service piping, valves, and backflow preventers.

2. Sprinkler Occupancy Hazard Classifications

a. Diesel Storage Tank Room - Ordinary Hazard, Group 2.

b. Generator Room – Ordinary Hazard, Group 2.

3. Minimum Density for Automatic Sprinkler Piping Design

a. Ordinary Hazard, Group 2 Occupancy - 0.20 gpm throughout each individual room.

4. Maximum Protection Area per Sprinkler - Per UL listing and FM listing of sprinkler.

5. Total Combined Hose Stream Demand Requirement - According to NFPA 13, unless otherwise indicated:

a. Ordinary Hazard Occupancies - 250 gpm for 60 to 90 minutes.

1.5 SUBMITTALS

A. Product Data - For the following:

1. Piping materials, including sprinkler specialty fittings.

2. Pipe hangers and supports.

3. Valves, including listed fire protection valves, unlisted general duty valves, and specialty valves and trim.

4. Air compressors, including electrical data.

5. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.

6. Fire department connections, including type; number, size, and arrangement of inlets; caps and chains; size and direction of outlet; escutcheon and marking; and finish.

7. Alarm devices, including electrical data.

B. Shop Drawings - NFPA 13 drawings, hydraulic calculations for each design area with cross reference to applicable drawings, water supply data, and equipment schedule to Owner's Representative, Insurance Underwriter, and other authorities having jurisdiction. Bind hydraulic and flow test calculations in 3-tab cardboard pocket folder with corresponding drawing(s) in folder pocket. Use one folder for each set of each floor or zone of protection with divider tabs between multiple sets of calculations. Label folder front with floor or zone.

C. Fire Hydrant Flow Test Report - Prior to system layout, submit detailed fire flow test data per NFPA 291. Include scaled/dimensioned sketch showing flow/pressure locations/elevations; number/size/coefficient for orifices; pitot/static/residual pressures; test time/date; main sizes. Use water supply data as directed by Owner's Representative.

D. Approved Sprinkler Piping Drawings - Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations, if applicable.

E. Field Test Reports and Certificates - Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping."

F. Welding certificates.

G. Field quality control test reports.

H. Record Drawings - In each Operation and Maintenance Manual, record drawings, hydraulic calculations, flow test reports, NFPA Above/Below Ground Material and Test Certificates, and original pamphlet of NFPA 25. Bind in sets.

1.6 QUALITY ASSURANCE

A. Installer Qualifications

1. Installer's responsibilities include, but are not limited to, layout, fabricating, and installing fire suppression systems.

a. Installing contractor shall have certified NICET Level III or higher Engineering Technician certified in fire protection/automatic sprinkler system layout who shall supervise layout installation.

B. Welding - Qualify processes and operators according to ASME Boiler and Pressure Vessel Code - Section IX.

C. NFPA Standards - Fire suppression system equipment, specialties, accessories, installation, and testing shall comply with the following:

1. NFPA 13 (2016), Installation of Sprinkler Systems.

2. NFPA 291 (2016), Recommended Practice for Flow Testing and Marking of Hydrants.

D. Factory Mutual (FM) Approval Guide.

E. Underwriters Laboratories, Inc. (UL) Fire Protection Equipment Directory.

F. Requirements of insurance underwriter and other authorities having jurisdiction.

G. 2020 Building Code of New York State.

H. 2020 Fire Code of New York State.

1.7 COORDINATION

A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

1.8 SPRINKLER CABINETS

A. Sprinkler Cabinets - Finished, wall-mounting, steel cabinet with hinged cover, with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler on project.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 Articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers - Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 STEEL PIPE AND FITTINGS

A. Threaded-End, Standard-Weight Steel Pipe - ASTM A53/A53M, ASTM A135, or ASTM A795 factory- or field-formed threaded ends.

1. Cast Iron Threaded Flanges - ASME B16.1.

2. Malleable Iron Threaded Fittings - ASME B16.3.

3. Gray Iron Threaded Fittings - ASME B16.4.

4. Steel Threaded Pipe Nipples - ASTM A733, made of ASTM A53/A53M or ASTM A106, Schedule 40, seamless steel pipe. Include ends matching joining method.

5. Steel Threaded Couplings - ASTM A865.

B. Grooved End, Standard Weight Steel Pipe - ASTM A53/A53M, ASTM A135, or ASTM A795 with factory or field formed square cut or roll grooved ends.

1. Grooved Joint Piping Systems

a. Manufacturers

1) Wheatland.

2) Victaulic Co. of America.

3) Viking Group Inc.

4) Or equal.

b. Grooved End Fittings - UL-listed, ASTM A536, ductile iron casting with OD matching steel pipe OD.

c. Grooved End Pipe Couplings - UL 213 and AWWA C606, rigid pattern, unless otherwise indicated; gasketed fitting matching steel pipe OD. Include ductile iron housing with keys matching steel pipe and fitting grooves, rubber gasket listed for use with housing, and steel bolts and nuts.

2.3 SPRINKLER SPECIALTY FITTINGS

A. Sprinkler specialty fittings shall be UL listed or FMG approved, with 175 psig minimum working pressure rating, and made of materials compatible with piping.

B. Outlet Specialty Fittings

1. Manufacturers

a. Wheatland.

b. Victaulic Co. of America.

c. Viking Group Inc.

d. Or equal.

2. Mechanical T and Cross Fittings - UL 213, ductile iron housing with gaskets, bolts and nuts, and threaded, locking lug, or grooved outlets.

3. Snap-On and Strapless Outlet Fittings - UL 213, ductile iron housing or casting with gasket and threaded outlet.

C. Sprinkler Drain and Alarm Test Fittings - Cast or ductile iron body; with threaded or locking lug inlet and outlet, test valve, and orifice and sight glass.

1. Manufacturers

a. Tyco Fire Suppression & Building Products.

b. Viking Corp.

c. Victaulic Co. of America.

D. Sprinkler Inspector's Test Fitting - Cast or ductile iron housing with threaded inlet and drain outlet and sight glass.

1. Manufacturers

a. AGF Manufacturing Co.

b. Tyco Fire Suppression & Building Products.

c. G/J Innovations, Inc.

d. Triple R Specialty of Ajax, Inc.

E. Drop Nipple Fittings - UL 1474, adjustable with threaded inlet and outlet, and seals.

1. Manufacturers

a. CECA, LLC.

b. Merit.

F. Dry Pipe System Fittings - UL listed for dry pipe service.

2.4 LISTED FIRE PROTECTION VALVES

A. Valves shall be UL listed or FMG approved with 175 psig minimum pressure rating.

B. Ball Valves - Comply with UL 1091, except with ball instead of disc.

1. NPS 1-1/2 and Smaller - Bronze body with threaded ends.

2. NPS 2 and NPS 2-1/2 - Bronze body with threaded ends or ductile iron body with grooved ends.

3. Manufacturers

a. NIBCO.

b. Victaulic Co. of America.

C. OS&Y Valve - UL 262.

1. NPS 2-1/2 and Larger - Bronze, cast iron, or ductile iron body; with flanged or grooved ends.

a. Manufacturers

1) Tyco Fire Suppression & Building Products.

2) McWane, Inc.; Kennedy Valve Div.

3) Mueller Company.

4) NIBCO.

5) Pratt, Henry Company.

6) Victaulic Co. of America.

D. Check Valves NPS 2 and Larger - UL 312, swing type, cast iron body with flanged or grooved ends.

1. Manufacturers

a. American Cast Iron Pipe Co.; Waterous Co.

b. Tyco Fire Suppression & Building Products.

c. Clow Valve Co.

d. Crane Co.; Crane Valve Group; Crane Valves.

e. McWane, Inc.; Kennedy Valve Div.

f. Mueller Company.

g. NIBCO.

h. Potter-Roemer; Fire Protection Div.

i. Reliable Automatic Sprinkler Co., Inc.

j. Stockham.

k. United Brass Works, Inc.

l. Victaulic Co. of America.

m. Watts Industries, Inc.; Water Products Div.

2.5 BACKFLOW PREVENTERS

A. Double Check Valve Type (Fire Protection Only).

1. Cast iron body, stainless steel bolts and internal parts, with test ports and isolation valves.

2. UL/FM.

3. Same size as fire service.

4. Manufacturers - Watts, Beeco, Febco, or approved equal.

2.6 SPECIALTY VALVES

A. Sprinkler System Control Valves - UL listed or FMG approved, cast or ductile iron body with flanged or grooved ends and 175 psig minimum pressure rating.

1. Manufacturers

a. AFAC Inc.

b. Tyco Fire Suppression & Building Products.

c. Firematic Sprinkler Devices, Inc.

d. Reliable Automatic Sprinkler Co., Inc.

e. Victaulic Co. of America.

f. Viking Corp.

2. Dry Pipe Valves - UL 260, differential type; with bronze seat with O-ring seals, single-hinge pin, and latch design. Include UL 1486, quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.

a. Air Pressure Maintenance Device - UL 260, automatic device to maintain correct air pressure in piping. Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, pressure ratings with 14 to 60 psig adjustable range, and 175 psig maximum inlet pressure.

1) Manufacturers

a) AFAC Inc.

b) Tyco Fire Suppression & Building Products.

c) General Air Products, Inc.

d) Reliable Automatic Sprinkler Co., Inc.

e) Viking Corp.

b. Air Compressor - UL 753, fractional horsepower, 120-V ac, 60 Hz, single phase.

1) Manufacturers

a) Jenny.

b) Gast Manufacturing, Inc.

c) Reliable Automatic Sprinkler Co., Inc.

d) Viking Corp.

e) General Air Products, Inc.

c. Manual Desiccant Air Dryer and Coalescing Filter

1) Manufacturers

a) Jenny.

b) Gast Manufacturing, Inc.

c) Reliable Automatic Sprinkler Co., Inc.

d) Viking Corp.

e) General Air Products, Inc.

B. Automatic Drain Valves - UL 1726, NPS 3/4, ball-check device with threaded ends.

1. Manufacturers - AFAC Inc.

2.7 SPRINKLERS

A. Sprinklers shall be UL listed or FMG approved with 175 psig minimum pressure rating.

B. Manufacturers

1. Tyco Fire Suppression & Building Products.

2. Reliable Automatic Sprinkler Co., Inc.

3. Victaulic Co. of America.

4. Viking Corp.

C. Automatic Sprinklers - With heat responsive element complying with the following:

1. UL 199, for nonresidential applications.

2. UL 1767, for early-suppression, fast-response applications.

D. Sprinkler Types and Categories - Nominal 1/2-inch orifice for "Ordinary" temperature classification rating, unless otherwise indicated or required by application.

E. Upright type sprinklers shall be used throughout.

F. Sprinkler Finishes - Bronze.

2.8 FIRE DEPARTMENT CONNECTIONS

A. Manufacturers

1. AFAC Inc.

2. Tyco Fire Suppression & Building Products.

3. Elkhart Brass Mfg. Co., Inc.

4. Fire-End and Croker Corp.

5. Fire Protection Products, Inc.

6. GMR International Equipment Corporation.

7. Guardian Fire Equipment Incorporated.

8. Potter-Roemer; Fire-Protection Div.

9. Reliable Automatic Sprinkler Co., Inc.

10. United Brass Works, Inc.

B. Wall Type, Fire Department Connection - UL 405, 175 psig minimum pressure rating with corrosion-resistant metal body with brass inlets, brass wall escutcheon plate, brass lugged caps with gaskets and brass chains, and brass lugged swivel connections. Include inlets with threads according to NFPA 1963 and matching local fire department sizes and threads, outlet with pipe threads, extension pipe nipples, check devices or clappers for inlets, and escutcheon plate with marking similar to "AUTO SPKR."

1. Type - STORZ connection.

2. Finish - Polished chrome-plated.

2.9 ALARM DEVICES

A. Alarm device types shall match piping and equipment connections.

B. Pressure Switch - UL 753, electrical supervision type, water flow switch with retard feature. Include single-pole, double-throw, normally closed contacts and design that operates on rising pressure and signals water flow.

1. Manufacturers

a. Potter Electric Signal Company.

b. System Sensor.

c. Viking Corp.

C. Valve Tamper Switch - UL 753, electrical, single-pole, double-throw switch with normally closed contacts. Include design that signals controlled valve is in other than fully open position.

1. Manufacturers

a. McWane, Inc.; Kennedy Valve Div.

b. Potter Electric Signal Company.

c. System Sensor.

D. Low Air Pressure Switch – UL 753, electrical, single-pole, double-throw switch with normally closed contacts.

1. Manufacturers

a. McWane, Inc.; Kennedy Valve Div.

b. Potter Electric Signal Company.

c. System Sensor.

2.10 PRESSURE GAGES

A. Manufacturers

1. AGF Manufacturing Co.

2. AMETEK, Inc.; U.S. Gauge.

3. Brecco Corporation.

4. Dresser Equipment Group; Instrument Div.

5. Marsh Bellofram.

6. WIKA Instrument Corporation.

B. Description - UL 393, 3-1/2-inch to 4-1/2-inch- diameter, dial pressure gage with range of 0 to 300 psig.

1. Water System Piping - Include caption "WATER" or "AIR/WATER" on dial face.

2. Air System Piping - Include caption "AIR" or "AIR/WATER" on dial face.

2.11 SIGNAGE AND LOCKS

A. At control, drain and test valves and risers, provide baked red enamel metal or plastic engraved signs indicating the valve's purpose, what portion of the structure it serves, and design data. Size and verbiage as reviewed and directed by Owner's Representative.

B. Locks - Solid brass body, with steel shackle, master keyed padlock.

1. Make - Folger Adams, Master Lock Co., Yale, or approved equal.

2. Graphic fire department connection sign, shop fabricated to be 18 inches x 18 inches x 1/16 inch smooth aluminum plate, white reflective background, red block letters, and NFPA 170 graphic sprinkler connection symbol.

PART 3 EXECUTION

3.1 PREPARATION

A. Perform fire hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in Article 1.07.

B. Report test results promptly and in writing.

3.2 EXAMINATION

A. Examine roughing-in for hose connections and stations to verify actual locations of piping connections before installation.

B. Examine walls and partitions for suitable thicknesses, fire- and smoke-rated construction, framing for hose station cabinets, and other conditions where hose connections and stations are to be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PIPING APPLICATIONS, GENERAL

A. Shop weld pipe joints where welded piping is indicated.

B. Do not use welded joints for galvanized-steel pipe.

C. Flanges, flanged fittings, unions, nipples, and transition and special fittings with finish and pressure ratings same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.

D. Piping between Fire Department Connections and Check Valves - Galvanized, standard weight steel pipe with threaded ends; cast or malleable iron threaded fittings; and threaded joints.

E. Pipe Line Sizing

1. Pipe sizes called for shall be maintained. Pipe size changes made only as reviewed by Owner's Representative and/or Engineer.

2. Where discrepancy in size occurs, the larger size shall be provided.

3.4 SPRINKLER SYSTEM PIPING APPLICATIONS

A. Standard Pressure, Dry Pipe Sprinkler System, 175 psig Maximum Working Pressure.

1. Sprinkler Piping Fitting Option - Specialty sprinkler fittings, NPS 3 and smaller, including mechanical T and cross fittings, may be used downstream from sprinkler zone valves.

2. NPS 2 and smaller - Threaded end, black, standard weight steel pipe; cast or malleable iron threaded fittings; and threaded joints.

3. NPS 2-1/2 to NPS 6 - Grooved end, black, standard weight steel pipe; grooved end fittings; grooved end pipe couplings; and grooved joints.

3.5 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Listed Fire Protection Valves - UL listed and FMG approved for applications where required by NFPA 13.

a. Shutoff Duty - Use ball or gate valves.

3.6 JOINT CONSTRUCTION

A. Refer to Section 15310, Common Work Results for Fire Suppression, for basic piping joint construction.

B. Threaded Joints - Comply with NFPA 13 for pipe thickness and threads. Do not thread pipe smaller than NPS 8 with wall thickness less than Schedule 40 unless approved by authorities having jurisdiction and threads are checked by a ring gage and comply with ASME B1.20.1.

C. Pressure-Sealed Joints - Use UL-listed tool and procedure. Include use of specific equipment, pressure sealing tool, and accessories.

D. Grooved Joints - Assemble joints with listed coupling and gasket, lubricant, and bolts.

1. Ductile Iron Pipe - Radius cut groove ends of piping. Use grooved end fittings and grooved end pipe couplings.

2. Steel Pipe - Square cut or roll groove piping as indicated. Use grooved end fittings and rigid, grooved end pipe couplings, unless otherwise indicated.

3. Dry Pipe Systems - Use fittings and gaskets listed for dry pipe service.

E. Dissimilar Metal Piping Joints - Construct joints using dielectric fittings compatible with both piping materials.

1. NPS 2 and Smaller - Use dielectric unions.

2. NPS 2-1/2 to NPS 4 - Use dielectric flanges.

3. NPS 5 and Larger - Use dielectric flange insulation kits.

3.7 SERVICE ENTRANCE PIPING

A. Connect fire suppression piping to water service piping of size and in location indicated for service entrance to building.

B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at the noted location.

C. Install shutoff valve, check valve, pressure gage, and drain at the noted location.

3.8 PIPING INSTALLATION

A. Refer to Section 15310, Common Work Results for Fire Suppression, for basic piping installation.

B. Locations and Arrangements - Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

C. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

D. Install unions adjacent to each valve in pipes NPS 2 and smaller. Unions are not required on flanged devices or in piping installations using grooved joints.

E. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, sized and located according to NFPA 13.

F. Install sprinkler piping with drains for complete system drainage.

G. Schedule, coordinate, and activate systems or portions of the system to operational status as soon as possible.

H. Install ball drip valves to drain piping between fire department connections and check valves. Drain to floor drain or discharge at exterior 24 inches above finished grade.

I. Install alarm devices in piping systems.

J. Hangers and Supports - Comply with NFPA 13 for hanger materials.

1. Install sprinkler system piping according to NFPA 13.

K. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.

L. Drain dry pipe sprinkler piping.

M. Pressurize and check dry pipe sprinkler system piping and air compressors.

3.9 VALVE INSTALLATION

A. Install listed fire protection valves, unlisted general duty valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire protection shutoff valves supervised open, located to control sources of water supply except from fire department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install backflow preventer in potable water supply sources.

D. Specialty Valves

1. Dry Pipe Valves - Install trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill line attachment.

a. Air Pressure Maintenance Devices for Dry Pipe Systems - Install shutoff valves to permit servicing without shutting down sprinkler system; bypass valve for quick system filling; pressure regulator or switch to maintain system pressure; strainer; pressure ratings with 14 to 60 psig adjustable range; and 175 psig maximum inlet pressure.

b. Install air compressor and compressed air supply piping.

E. Provide padlocks and cadmium-plated steel chains to lock open control valves.

3.10 SPRINKLER INSTALLATION

A. Use standard coverage upright sprinklers.

B. Provide protection under ductwork, groups of ductwork, and other obstructions to water spray and distribution. Use intermediate level sprinklers if subject to water spray from above.

3.11 FIRE DEPARTMENT CONNECTION INSTALLATION

A. Install wall-type fire department connections in vertical wall.

B. Install ball drip valve at each check valve for fire department connection.

C. Fire department connections (FDC) to be 3 feet above finished grade drain to floor or outside building.

3.12 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Connect water supply piping to fire suppression piping. Include backflow preventer between potable water piping and fire suppression piping.

D. Install ball drip valves at each check valve for fire department connection. Drain to floor drain or outside building.

E. Connect piping to specialty valves, hose valves, specialties, fire department connections, and accessories.

F. Connect compressed air supply to dry pipe sprinkler piping.

G. Connect air compressor to the following piping and wiring:

1. Pressure gages and controls.

2. Electrical power system, Division 16.

3. Fire alarm devices, including low pressure alarm.

H. Electrical Connections - Power wiring is specified in Division 16.

I. Connect alarm devices to fire alarm.

J. Ground equipment according to Division 16.

K. Connect wiring according to Division 16.

L. Tighten electrical connectors and terminals according to manufacturer's published torque tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.13 LABELING AND IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Install FDC graphic signs with brass/stainless steel hardware at each sign corner and 5 feet above FDC.

C. Permanently mount valve I.D. signs on piping or wall at valve. Hanging sign on valve, which permits easy removal, is not permitted.

3.14 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. Leak Test - After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3. Energize circuits to electrical equipment and devices.

4. Start and run air compressors.

5. Flush, test, and inspect sprinkler systems according to NFPA 13, Systems Acceptance chapter.

6. Coordinate with fire alarm tests. Operate as required.

7. Verify that equipment hose threads are same as local fire department equipment.

8. Test backflow preventers in accordance with NFPA 13, Systems Acceptance chapter.

B. Report test results promptly and in writing to Architect and authorities having jurisdiction.

3.15 CLEANING AND PROTECTION

A. Clean dirt and debris from sprinklers.

B. Remove and replace sprinklers with paint other than factory finish.

C. Protect sprinklers from damage until Substantial Completion.

3.16 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain specialty valves.

TABLE 15326-1

PIPING MATERIALS (FIRE PROTECTION)

Service	**Pipe Materials**	**Fittings**	**Connections**
Sprinkler (dry)	Schedule 40 black steel 2" and smaller	Class 125 black cast iron	Threaded
	Schedule 40 black steel 2-1/2" and larger	Malleable or ductile iron	Roll grooved mechanical-type couplings

END OF SECTION

SECTION 15510

HYDRONIC PIPING

PART 1 GENERAL

1.1 WORK INCLUDED

A. Pipe and pipe fittings.

B. Hydrostatic testing.

1.2 RELATED SECTIONS

A. Section 15515 – Hydronic Specialties

B. Section 15762 – Hot Water Unit Heaters

1.3 REFERENCES

A. ANSI/ASME - Boiler and Pressure Vessel Code

B. ANSI/ASME Sec. 9 - Welding and Brazing Qualifications

C. ASME A13.1 - Identification of Piping Systems

D. ANSI/ASME B16.3 - Malleable Iron Threaded Fittings Class 150 and 300

E. ANSI/ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings – DWV

F. ANSI/ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV

G. ANSI/ASME B31.9 - Building Services Piping

H. ANSI/AWS A5.8 - Brazing Filler Metal

I. ANSI/AWS D1.1 - Structural Welding Code

J. ASTM A53 - Pipe, Steel, Black and Hot Dipped Zinc Coated, Welded and Seamless

K. ASTM A120 - Pipe, Steel, Black and Hot Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses

L. ASTM A234 - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures

M. ASTM B32 - Solder Metal

N. ASTM B88 - Seamless Copper Water Tube

O. New York State Mechanical Code

1.4 REGULATORY REQUIREMENTS

A. Conform to ANSI/ASME B31.9.

B. Conform to latest New York State Mechanical Code.

1.5 QUALITY ASSURANCE

A. Valves - Manufacturer’s name and pressure rating marked on valve body.

1.6 SUBMITTALS

A. Submit in accordance with these specifications.

B. Include data on pipe materials, pipe fittings, valves, piping identification system, and accessories.

C. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer’s name and model number.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of these specifications.

B. Store and protect products under provisions of these specifications.

C. Deliver and store valves in shipping containers with labeling in place.

PART 2 PRODUCTS

2.1 HEATING WATER PIPING, ABOVEGROUND

A. Steel Pipe - ASTM A53 or A120, Schedule 40, black.

1. Fittings - ANSI/ASTM B16.3, malleable iron or ASTM A234, forged steel welding-type fittings.

2. Joints - Screwed for pipe 2-inches and under or ANSI/AWS D1.1, welded for 2-1/2-inch pipe and greater.

B. Copper Tubing - ASTM B88, Type L, hard drawn.

1. Fittings - ANSI/ASME B16.23 cast brass of ANSI/ASME B16.29 solder wrought copper.

2. Joints - ANSI/AWS A5.8, BCuP silver braze.

2.2 FLANGES, UNIONS AND COUPLINGS

A. Pipe Size 2-1/2 Inches and Under - 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.

B. Pipe Size Over 2-1/2 Inches - 150 psig forged steel slip on flanges for ferrous piping; bronze flanges for copper piping; 1/16-inch thick preformed.

PART 3 EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. After completion, fill, clean, and treat systems.

3.2 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient.

B. Install piping to conserve building space, and not interfere with use of space and other work.

C. Group piping whenever practical at common elevations.

D. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.

E. Provide clearance for installation and access to valves and fittings.

F. Prepare pipe, fittings, supports, and accessories for finish painting. Refer to Section 09900, Painting.

G. Install valves with stems upright or horizontal, not inverted.

3.3 HYDROSTATIC TESTING

A. Preparation for Testing

1. General - Prior to initial operation, hydronic piping system (all existing and new piping) shall be tested for leakage in the presence of the Engineer. Notify Engineer one week prior to conducting tests.

2. Exposure of Joints - All joints, including welds, shall be left uninsulated and exposed for examination during the test.

3. Expansion Joints - Expansion joints, which cannot sustain the reactions due to test pressure, shall be provided with temporary restraint, or they may be isolated from testing.

4. Precautions Against Overpressure - If the test pressure is to be maintained for a period of time during which the test fluid is subject to thermal expansion or any other source of overpressurizing during the test, precautions such as the installation of a relief device shall be taken to avoid excessive pressure.

B. Hydrostatic Testing (Reference: ANSI/ASME B31.9, Building Services Piping)

1. Test Medium - Water at ambient temperature shall be used as the test medium except where there is risk of damage due to freezing. Another liquid may be used if it is safe for workmen and compatible with the piping.

2. Preliminary Check - The system shall be examined to see that all equipment and parts that cannot withstand the test pressure are properly isolated. Test equipment shall be examined to ensure that it is tight and that low-pressure filling lines are disconnected.

3. Hydrostatic Test Pressure

a. Minimum Pressure - Except as limited in paragraph b below, a piping system shall be subjected to a hydrostatic test pressure, which at every point in the system is not less than 1.5 times the design pressure.

b. Maximum Pressure - The test pressure shall not exceed the maximum test pressure for any vessel, pump, valve, or other component in the system under test. A check shall be made to verify that the stress due to pressure at the bottom of vertical runs does not exceed either of the following:

1) 90 percent of specified minimum yield strength.

2) 1.7 times the SE value (for brittle materials).

4. Examination for Leakage - Following the application of hydrostatic test pressure for at least 30 minutes, examination shall be made for leakage of the piping, and at all joints and connections. If leaks are found, they shall be eliminated by tightening, repair, or replacement, as appropriate, and the hydrostatic test repeated until no leakage is found.

5. Provide Engineer with written report of the test procedure and results.

3.4 CLEANING AND TREATMENT HOT WATER SYSTEM

A. Procedure - Thoroughly flush out entire hydronic system (existing and new piping). Clean all gage glasses, vents, strainers, etc. Fill system, venting as required, check volume while filling. Add 1.8-lb. trisodium phosphate or other submitted and approved product for each 50 gallons in system. Circulate solution minimum at maximum operating temperature. To check impurities fill a quart bottle with system water and allow it to settle. Check for impurities and confirm with Engineer. Repeat flushing and test as required until samples prove clean.

3.5 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.

B. Install valves for isolation and flow control services.

3.6 PIPING SCHEDULE

A. Provide piping in accordance with the following schedule and to meet existing conditions or as otherwise noted on the Contract Drawings.

APPLICATION	SIZES	MATERIAL	SCHEDULE	FITTINGS	JOINTS
Hydronic	2-1/2 inches and under	Steel pipe ASTM A53 or A120	40	ANSI/ASME B16.3, malleable iron or ASTM A234 forced steel welding-type fittings	Screwed
Hydronic	2-1/2 inches and under	Type L copper	--	Copper	Soldered

END OF SECTION

SECTION 15515

HYDRONIC SPECIALTIES

PART 1 GENERAL

1.1 WORK INCLUDED

A. Air vents.

B. Strainers.

C. Balancing valves.

D. Control valves.

1.2 RELATED SECTIONS

A. Section 15510 – Hydronic Piping

B. Section 15762 – Hot Water Unit Heaters

1.3 REFERENCES

A. ANSI/ASME - Boilers and Pressure Vessels Code.

B. New York State Mechanical Code (Latest Edition).

1.4 REGULATORY REQUIREMENTS

A. Conform to ANSI/ASME Boilers and Pressure Vessels Code Section 8D for manufacture of tanks.

1.5 QUALITY ASSURANCE

A. Manufacturer - For each product specified, provide components by same manufacturer throughout.

1.6 SUBMITTALS

A. Submit product data under provisions of these specifications

B. Submit product data for manufactured products and assemblies required for this project.

C. Include component sizes, rough in requirements, service sizes, and finishes. Include product description, model and dimensions.

D. Submit manufacturer's installation instructions under provisions of Section 01300, Submittals.

E. Submit written test results for glycol/water solution strength.

1.7 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of these specifications.

B. Include installation instruction, assembly views, lubrication instructions, and replacement parts list.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of these specifications.

B. Store and protect products under provisions of these specifications.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - AIR VENTS

A. Armstrong.

B. Taco.

C. Bell & Gossett.

D. Or equal.

2.2 AIR VENTS

A. Manual Type - Short vertical sections of 2-inch diameter pipe to form air chamber, with 1/8-inch brass needle valve at top of chamber.

B. Float Type - Brass or semi steel body, copper float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.

C. Washer Type - Brass with hydroscopic fiber discs, vent ports, adjustable cap for manual shutoff, and integral spring loaded ball check valve.

2.3 ACCEPTABLE MANUFACTURERS - STRAINERS

A. Bell & Gossett.

B. Armstrong.

C. Taco.

D. Or equal.

2.4 STRAINERS

A. Size 2-Inch and Under - Screwed brass or iron body for 175 psig working pressure, Y-pattern with 1/32-inch stainless steel perforated screen. Flanged body type, 2-1/2 inch and larger

2.5 ACCEPTABLE MANUFACTURERS - BALANCING VALVES

A. Tour and Anderson - Model: STAD.

B. Bell & Gossett - Model: CB, Circuit Setter.

C. Armstrong - Model: CBV.

D. Or equal.

2.6 BALANCING VALVES

A. Bronze body, brass ball valve construction, positive shutoff construction.

B. Memory stop.

C. Integral valve readout ports across valve seat.

D. Drain port.

2.7 ACCEPTABLE MANUFACTURERS - CONTROL VALVES

A. Belimo.

B. Honeywell.

C. Or equal.

2.8 CONTROL VALVES

A. Bronze body, Teflon seat, stainless steel ball and stem and springs, 120V on/off control actuator, fail safe open.

PART 3 EXECUTION

3.1 INSTALLATION AND APPLICATION

A. Install specialties in accordance with manufacturer's instructions to permit intended performance.

B. Support specialties in accordance with manufacturer's instructions.

C. Train Owner in use of equipment.

END OF SECTION

SECTION 15616

ENGINE EXHAUST SYSTEM

PART 1 GENERAL

1.1 SCOPE

A. The work to be performed consists of providing all labor, equipment, materials, etc. to furnish and install new factory built generator engine exhaust systems, as described in the specifications herein.

1.2 RELATED SECTIONS

A. Division 15 - Mechanical

1.3 REFERENCES

A. NFPA 37 - Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines

B. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances

1.4 QUALITY ASSURANCE

A. All products furnished under this Section shall conform to the requirements of NFPA 37 and NFPA 211 for exhaust gas temperatures not exceeding 1400°F. Products shall be listed to UL 103 positive pressure tested and listed to 60" w.c. and shall carry the appropriate UL and cUL listing mark or label.

B. Engine exhaust system shall be listed as suitable for an internal maximum static pressure rating of 60" w.c.

1.5 SUBMITTALS

A. The CONTRACTOR shall submit, in a timely manner, all submittals in accordance with these specifications. Under no circumstances shall the CONTRACTOR install any materials until the ENGINEER has made final approval on the submittals.

B. Shop Drawings: Shop drawings shall be submitted to the ENGINEER for approval and shall consist of:

1. General assembly and layout drawings and information of the exhaust stack system including materials, dimensions, sizing, joining method, and installation instructions.

2. Manufacturer's Warranties: Manufacturer's printed warranties, as specified hereinafter, shall be submitted prior to final acceptance by the ENGINEER.

3. Manufacturer's Field Service: Manufacturer's printed field service procedures and reports as specified hereinafter, shall be submitted prior to final acceptance by the ENGINEER. Report forms shall contain all information as required to do start-up and testing as required by system manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING.

A. The CONTRACTOR shall be responsible for the timely delivery of the equipment to the jobsite. The CONTRACTOR shall be responsible for unloading and rigging of the equipment. The CONTRACTOR shall be responsible for protecting the equipment from the weather, humidity, and temperature conditions, dirt, dust, other contaminants, as well as jobsite conditions during construction.

B. Equipment shall be unloaded, handled and stored in accordance with the manufacturer's handling and storage instructions.

C. Responsibility of making freight claims to be performed by the CONTRACTOR or OWNER personnel.

1.8 WARRANTY

A. The Engine Exhaust System shall be warranted by the manufacturer against defects in material and workmanship for a period of one (1) year from the date of original installation. Any portion of the exhaust system repaired or replaced under warranty shall be warranted for the remainder of the original warranty period.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Engine Exhaust System.

1. Metal-Fab, Inc.

2. Or approved equal.

2.2 EXHAUST SYSTEM

A. All exhaust system pipe shall be double wall construction.

B. The exhaust system shall terminate a minimum of seven feet above the roof or as required by local codes.

C. Interior exhaust system piping shall be shall be constructed of a minimum .024" thick aluminized steel for sizes 6" through 24" outer wall and minimum .035" thick 304 stainless steel for sizes 6" through 24". Insulation shall be 4" ceramic fiber between walls.

D. Exterior exhaust system (Includes through roof deck) piping shall be shall be constructed of a minimum .024" thick 304 stainless steel for sizes 6" through 24" outer wall and minimum .035" thick 304 stainless steel for sizes 6" through 24". Insulation shall be 2" ceramic fiber between walls.

E. All supports, drains, roof penetrations, terminations, flange adapters, relief valve assemply, and fittings required to install the exhaust pipe shall be included. Lined bellows joints shall be used to compensate for expansion.

F. All inner pipe joints shall be held together by means of formed vee bands and sealed with High Temperature Sealant.

G. Where exposed to weather, the outer bands shall be sealed to prevent rainwater from entering the space between the inner and outer walls.

H. Screws shall be of the hex-head type with shoulder stops and tapered lead-in threads.

I. Nuts for the inner and outer bands shall be retained by means of a free-floating cage to allow for alignment.

J. Seal clips should be used in conjunction with vee bands on diameters 6 thru 10 inch.

PART 3 EXECUTION

3.1 GENERAL

A. Installation shall be provided by the CONTRACTOR in accordance with the requirements of the codes specified hereinbefore. All of the CONTRACTOR's work shall be performed by experienced personnel previously engaged in engine exhaust systems and shall be under the supervision of a qualified installation supervisor.

3.2 INSTALLATION

A. Install equipment in strict compliance with manufacturer's instructions.

B. Install equipment in strict compliance with state and local codes, applicable NFPA standards, and UL listing.

C. Install alignment tolerance shall be at least plus or minus 1/8-inch or in accordance with manufacturer's installation alignment requirements, whichever is more stringent.

D. During construction provide temporary closures of metal or taped polyethylene on open end sections to prevent construction dust from entering exhaust system.

END OF SECTION

SECTION 15625

NATURAL GAS FIRED UNIT HEATERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section includes the minimum requirements for supply and installation of Hot Water Unit Heaters. This work shall include, but not be limited to, the following:

1. Gas unit heaters.

2. Thermostats.

1.2 RELATED SECTIONS

A. Section 15109 – Carbon Steel Piping System (Natural Gas)

1.3 REFERENCES

A. ASHRAE 103 - Heating Seasonal Efficiency of Central Furnaces and Boilers, Methods of Testing

B. NEMA MG 1 - Motors and Generators

C. NFPA 54 (AGA Z223.1) - National Fuel Gas Code

D. NFPA 70 - National Electrical Code

E. NFPA 90A - Installation of Air Conditioning and Ventilating Systems

F. NFPA 980B - Installation of Warm Air Heating and Air Conditioning Systems

G. NFPA 211 - Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances

H. Uniform Building Code of New York State

I. Energy Code of New York State

1.4 SUBMITTALS

A. Product Data: Provide manufacturer's literature and data indicating rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

B. Shop Drawings: Indicate assembly, required clearances, locations and sizes of field connections, and installation instructions.

C. Operation and Maintenance Data: Submit operation and maintenance manuals as directed in the General Specifications.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum five years documented experience.

1.6 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 GAS FIRED UNIT HEATERS

A. Manufacturer:

1. Modine (Model Type: HDS).

2. Reznor.

3. Trane.

4. Or equal.

B. Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating coil, controls, wall mounting bracket, and accessories.

1. Heating: Natural Gas Fired.

2. Discharge Louvers: Adjustable louvers to direct air flow.

C. Cabinet: manufacturer's standard steel and coating system.

D. Supply Fan: Propeller type with direct drive and fan guard meeting OSHA regulations.

E. Heat Exchanger: Aluminized steel.

F. Fan Motor: Totally enclosed motor rated for continuous duty with thermal overload protection.

G. Mounting: Provide ceiling or wall mounting brackets and accessories as required for installation location.

H. Gas Burner:

1. Burner shall be in-shot type.

2. Two-stage gas control.

3. Multi-try direct spark ignition.

4. Power exhauster with safety pressure switch to prevent pilot and main burner ignition until positive venting has been proved.

5. Automatic reset high limit switch mounted in the air stream to shut off the gas supply in the event of overheating

I. Operating Controls:

1. Room Thermostat: Cycles heater to maintain room temperature setting.

2. Units shall be capable of fan only operation.

3. Each unit shall be provided with gas pressure regulator, manual shut-off valve, and terminal board for low voltage wiring.

J. Performance: As indicated on the Contract Drawings.

2.2 ROOM THERMOSTATS

A. Adjustable Wall Mounted Thermostat: Provide to control heater operation to maintain temperature settings of the type and at locations as indicated on the Contract Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that space is ready for installation of units and openings are as indicated on Shop Drawings.

C. Verify that proper power supply is available.

D. Verify that proper fuel supply is available for connection.

3.2 INSTALLATION

A. Install in accordance with manufacturer’s recommendations and required clearances.

B. Install alignment tolerance shall be at least plus or minus 1/8-inch or in accordance with manufacturer's installation alignment requirements, whichever is more stringent.

C. Install in accordance with NFPA 90A, NFPA 90B, and the Uniform Building Code of New York State.

D. Install gas fired units to NFPA 54.

E. Provide vent connections to NFPA 211.

C. Thermostats shall be located and set per direction of OWNER and ENGINEER.

END OF SECTION

SECTION 15760

ELECTRIC UNIT HEATERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section includes the minimum requirements for supply and installation of Electric Unit Heaters. This work shall include, but not be limited to, the following:

1. Electric unit heaters.

2. Thermostats.

1.2 RELATED SECTIONS

A. Division 16 - Electrical

1.3 REFERENCES

A. NEMA MG 1 - Motors and Generators

1.4 SUBMITTALS

A. Product Data: Provide manufacturer's literature and data indicating rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

B. Shop Drawings: Indicate assembly, required clearances, locations and sizes of field connections, and installation instructions.

C. Operation and Maintenance Data: Submit operation and maintenance manuals as directed in the General Specifications.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum 5 years documented experience.

1.6 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 ELECTRIC UNIT HEATERS

A. Manufacturer:

1. Modine.

2. Qmark.

3. Chromalox.

4. Markel.

5. Reznor.

6. Trane.

7. Or approved equal.

B. Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating element, controls, wall mounting bracket, and accessories.

1. Heating: Electric.

2. Discharge Louvers: Adjustable louvers to direct air flow.

C. Cabinet: manufacturer's standard steel and coating system.

D. Supply Fan: Propeller type with direct drive.

E. Heat Element: Corrosion resistant steel fins.

F. Fan Motor: Totally enclosed motor rated for continuous duty with built-in thermal cutout and explosion proof rated at locations indicated on the Contract Drawings.

G. Mounting: Provide ceiling or wall mounting brackets and accessories as required for installation location.

H. Operating Controls:

1. Room Thermostat: Cycles heater to maintain room temperature setting.

2. Units shall be capable of fan only operation.

I. Performance: As indicated on the Contract Drawings.

2.2 ROOM THERMOSTATS

A. Adjustable Wall Mounted Thermostat: Provide to control heater operation to maintain temperature settings of the type and at locations as indicated on the Contract Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that space is ready for installation of units and openings are as indicated on Shop Drawings.

C. Verify that proper power supply is available.

3.2 INSTALLATION

A. Install in accordance with manufacturer’s recommendations and required clearances.

B. Install alignment tolerance shall be at least plus or minus 1/8-inch or in accordance with manufacturer's installation alignment requirements, whichever is more stringent.

C. Thermostats shall be located and set per direction of OWNER and ENGINEER.

END OF SECTION

SECTION 15762

HOT WATER UNIT HEATERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section includes the minimum requirements for supply and installation of Hot Water Unit Heaters. This work shall include, but not be limited to, the following:

1. Hot water unit heaters.

2. Thermostats.

1.2 RELATED SECTIONS

A. Section 15510 – Hydronic Piping

B. Section 15515 – Hydronic Specialties

C. Division 16 - Electrical

1.3 REFERENCES

A. NEMA MG 1 - Motors and Generators

1.4 SUBMITTALS

A. Product Data: Provide manufacturer's literature and data indicating rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

B. Shop Drawings: Indicate assembly, required clearances, locations and sizes of field connections, and installation instructions.

C. Operation and Maintenance Data: Submit operation and maintenance manuals as directed in the General Specifications.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum five years documented experience.

1.6 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 HOT WATER UNIT HEATERS

A. Manufacturer:

1. Modine.
2. Reznor.
3. Trane.
4. Or equal.

B. Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating coil, controls, wall mounting bracket, and accessories.

1. Heating: Hot Water.
2. Discharge Louvers: Adjustable louvers to direct air flow.

C. Cabinet: manufacturer's standard steel and coating system.

D. Supply Fan: Propeller type with direct drive and fan guard meeting OSHA regulations.

E. Coil: Coil elements and headers shall be of seamless copper tubing design with aluminum fins and steel pipe connections for supply and return.

F. Fan Motor: Totally enclosed motor rated for continuous duty with thermal overload protection.

G. Mounting: Provide ceiling or wall mounting brackets and accessories as required for installation location.

H. Operating Controls:

1. Room Thermostat: Cycles heater to maintain room temperature setting.
2. Units shall be capable of fan only operation.

I. Performance: As indicated on the Contract Drawings.

2.2 ROOM THERMOSTATS

A. Adjustable Wall Mounted Thermostat: Provide direct voltage type to control heater operation and control valve to maintain temperature settings of the type and at locations as indicated on the Contract Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that space is ready for installation of units and openings are as indicated on Shop Drawings.

C. Verify that proper power supply is available.

3.2 INSTALLATION

A. Install in accordance with manufacturer’s recommendations and required clearances.

B. Install alignment tolerance shall be at least plus or minus 1/8 inch or in accordance with manufacturer's installation alignment requirements, whichever is more stringent.

C. Thermostats shall be located and set per direction of OWNER and ENGINEER.

END OF SECTION

SECTION 15831

POWER VENTILATORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section defines the minimum requirements for supply and installation of power roof and wall ventilators.

1.2 RELATED SECTIONS

A. Division 15 - Mechanical

B. Division 16 - Electrical

1.3 REFERENCES

A. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. Air Moving and Conditioning Association (AMCA) Standards.

1.4 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Comply with applicable provisions of regulatory agencies below and others having jurisdiction.

1. National Fire Protection Association.

2. Underwriter's Laboratories, Incorporated.

3. National Electrical Code.

4. National Electric Manufacturers Association.

5. Local and State Building Codes and Ordinances.

B. Source Quality Control: Perform following tests and inspections at factory.

1. Fan wheels shall be statically and dynamically balanced.

1.5 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's literature, illustrations, specifications, and engineering data to include the following:

a. Dimensions.

b. Materials of construction.

c. Mounting details.

d. Performance Data - AMCA approved fan curves, for each model specified.

2. Drawings showing fabrication methods, assembly, installation details and accessories.

B. Test Reports: Submit the following test certifications for approval.

1. AMCA Label.

C. Operation and Maintenance Data: Submit operation and maintenance manuals as directed in the Contract Documents.

1.6 JOB CONDITIONS

A. Wall openings and penetrations shall be capped to prevent adverse weather from entering building prior to installation of units.

1.7 WARRANTY

A. Equipment shall be warrantied for a period of one year from date of startup.

PART 2 PRODUCTS

2.1 CENTRIFUGAL ROOF VENTILATOR

A. Manufacturer: Provide product(s) of one of the following:

1. Greenheck.

2. Or approved equal.

B. General

1. Description: Fan shall be aluminum housing, downblast centrifugal exhaust ventilator.

2. Certifications: Fan shall bear the AMCA Certified Ratings Seal for Sound and Air Performance.

3. Construction: Housing components shall be constructed of heavy gauge aluminum and provide a leak proof rigid support structure. The lower windband shall have a formed edge for added strength. An integral conduit chase shall be provided into the motor compartment to facilitate wiring connections. The motor shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. The unit shall bear an engraved aluminum nameplate. Nameplate shall indicate design CFM, static pressure and maximum fan RPM.

4. Wheel: Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum. Wheel shall be balanced in accordance with AMCA Standard 204-05, Balance Quality and Vibration Levels for Fans.

5. Motor:

a. Direct Drive:

i. Motor shall meet the performance requirements as shown on the Contract Drawings.

ii. Non-explosion proof applications - Motor shall be a DC electronic communication type motor (ECM) with circuitry to convert AC power to DC power and a speed controller mounted at the motor with 80 percent turndown capability.

iii. Explosion proof applications - TEFC motors shall be heavy-duty type with permanently lubricated sealed ball bearings mounted on vibration isolators out of air stream.

6. Each fan shall meet the performance requirements as shown on the Contract Drawings.

C. ACCESSORIES

1. Roof Curb:

a. 18-gauge galvanized steel with 1-inch, 3 lbs density insulation and damper tray minimum 12 inches high.

2. Backdraft Dampers:

a. Gravity operated:

i. Galvanized blade construction.

ii. TPE blade seals.

iii. Stainless steel or bronze bearings.

iv. Balanced design for minimal resistance to airflow.

3. Bird Screen: aluminum screen securely anchored to housing at air outlet.

4. Fan mounted disconnect switch NEMA rated for service conditions.

2.2 PROPELLER WALL VENTILATOR (EF-1-5)

A. Manufacturer: Provide product(s) of one of the following:

1. Greenheck.

2. Or approved equal.

B. General

1. Description: Fan shall be galvanized steel housing, wall mounted as indicated, propeller style ventilator.

2. Certifications: Fan shall bear the AMCA Certified Ratings Seal for Sound and Air Performance.

3. Construction: Housing components shall be constructed of heavy gauge galvanized steel with steel motor base, solid steel support rods, and mounting angle flange for wall opening. Steel components shall be galvanized. Steel components not capable of being galvanized shall be epoxy coated. The unit shall bear an engraved aluminum nameplate. Nameplate shall indicate design CFM, static pressure and maximum fan RPM.

4. Wheel: Wheel shall be propeller airfoil design constructed cast aluminum. Wheel shall be balanced in accordance with AMCA Standard 204, Balance Quality and Vibration Levels for Fans.

5. Motor:

    a. Direct Drive:

        i. Motor shall be TEFC type and meet the performance requirements as shown on the Contract Drawings.

        ii. Motor shall be heavy duty type with permanently lubricated sealed ball bearings.

6. Each fan shall meet the performance requirements as shown on the Contract Drawings.

C. ACCESSORIES

1. Pump Room Exhaust Damper (Greenheck Model ICD-44 or approved equal).

    a. Fabrication:

        i. Frame shall be .125-inch formed aluminum, 5-inch deep.

        ii. Blades shall be extruded aluminum air foil type with opposed blade action and insulated thermally broken airfoil type. Blades shall be polyurethane foam insulated.

        iii. Seals shall be provided for blades and jambs.

        iv. Bearings shall be synthetic type.

        v. Operators shall be electric fast acting (15 seconds or less) two position actuator in an aluminum housing, spring loaded to close, 120V, and 2 SPST internal auxiliary position indicating switches. Honeywell model MS4120F1204 or approved equal.

        vi. All components shall be mill finish.

2. Fan guards.

3. Wall housing/collar with mounting plate.

4. Single point power junction box, wired for fan and actuator with necessary transformer.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine mounting surface to receive fans for:

1. Level fan-mounting surface.

2. Water tightness.

3. Proper anchoring and sealing of mounting surface to prefabricated adapter curb to existing curb.

4. Unevenness, irregularities, and incorrect dimensions that would affect quality and execution of installation.

B. Do not proceed with installation of fan until mounting requirements conform to Specification or manufacturer requirements, whichever is more stringent.

3.2 INSTALLATION

A. Install ventilator in accordance with manufacturer's installation instructions.

B. Install alignment tolerance shall be at least plus or minus 1/8-inch or in accordance with manufacturer's installation alignment requirements, whichever is more stringent.

C. Anchor to mounting surface with lag screws or bolts.

D. Caulk and seal unit to provide moisture-proof installation.

E. Extend and connect ducts as required.

F. Install backdraft dampers per manufacturer requirements.

3.3 TESTING AND ADJUSTING

A. Start unit and observe for excessive noise or vibration.

B. Adjust drive system as needed.

3.4 CLEANING

A. Remove all debris and waste materials resulting from installation.

B. Clean tar, dirt and marks from exterior of units.

C. Touch up all chips in factory finishes.

END OF SECTION

SECTION 15840

METAL DUCTWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section defines the minimum requirements for metal ductwork, duct test holes, duct access doors, and expansion joints used for generator radiator exhaust systems.

1.2 RELATED SECTIONS

A. Division 15 - Mechanical

1.3 REFERENCES

A. ASTM A 36 - Structural Steel

B. AWS D9.1 - Welding of Sheet Metal

C. NFPA 90A - Installation of Air Conditioning and Ventilating Systems

D. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems

E. SMACNA - HVAC Air Duct Leakage Test Manual

F. SMACNA - HVAC Duct Construction Standards - Metal and Flexible

G. UL 181 - Factory-Made Air Ducts and Connectors

1.4 PERFORMANCE REQUIREMENTS

A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

B. The final pressure in the duct will depend on the actual duct components installed. It is the responsibility of the CONTRACTOR to make sure the duct pressure class and material thickness, as well and any stiffening, is suitable for the pressure encountered as well as any periodic maintenance loading as described by the SMACNA DCS.

1.5 SUBMITTALS

A. Submit in accordance with these specifications.

B. Shop Drawings: Indicated duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for all duct systems.

C. Product Data: Provide product data for all duct materials.

D. Samples: Provide samples as requested by the ENGINEER.

E. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following the SMACNA HVAC Air Duct Leakage Test Manual.

1.6 PROJECT RECORD DOCUMENTS

A. Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and Flexible. Maintain one copy of the document on site.

B. Any item, material, or detail not specified or indicated on the Contract Drawings shall be the standard of the manufacturer and shall be subject to Approval.

1.8 QUALIFICATIONS

A. The manufacturer(s) shall have at least 5 years' experience in producing similar type equipment.

B. The installer shall be a company specializing in performing the work of this section with a minimum of 5 years' experience.

1.9 REGULATORY REQUIREMENTS

A. Construct ductwork to NFPA 90A or NFPA 90B as applicable.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Do not install duct sealants when temperatures are less than those recommended by the sealant manufacturer.

B. Maintain temperatures during and after installation of duct sealants.

1.11 WARRANTY

A. Full warranty against defects in materials and workmanship for 1 year after final acceptance by the OWNER, including parts, labor, and expenses.

PART 2 PRODUCTS

2.1 MATERIALS

A. Ductwork

1. Galvanized Steel Ducts: Hot-dipped galvanized steel sheet, ASTM A 653/A 653M FS Type B, with G90/Z275 coating.

B. Fastening method:

1. Duct shall be welded or flanged with gaskets appropriate for the expected service.

C. Sealant:

1. Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic as approved by the manufacturer.

D. Expansion Joint:

1. Provide rubber duct molded joints at fan equipment connections and at duct locations to achieve allowable movement for duct expansion with materials suitable for system service listed as manufactured by Flexicraft, Holz Rubber, or approved equal.

E. Duct Test Holes

1. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

F. Permanent Test Holes: Factory fabricated, airtight, flanged fittings with screw cap. Provide extended neck fittings to clear insulation as necessary.

2.2 FABRICATION

A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

B. Construct T's, bends, and elbows with radius of not less than 1 - 1 ½ times width of duct on centerline. Where not possible and where rectangular elbows are used, provide turning vanes.

C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

D. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Joints shall be minimum 4-inch cemented slip joint, brazed or electric welded. Prime coat welded joints.

E. Provide standard 45-degree lateral wye takeoffs unless otherwise indicated where 90-degree conical tee connections may be used.

F. The CONTRACTOR is responsible for the design of all duct supports in accordance with New York State Uniform Code, SMACNA standards, and any contract drawing details. All support materials provided shall be corrosion resistant materials (galvanized steel material at a minimum). The CONTRACTOR shall submit proposed supports to the ENGINEER for review and approval prior to fabricating and installing supports. The submittal shall include—at a minimum—the locations of supports, types of supports, allowable loading on the support, duct wall thickness and expected maximum loading at each support.

2.3 MANUFACTURED DUCTWORK, ACCESS DOORS, AND FITTINGS

A. Manufacture in accordance with SMACNA HVAC Duct construction Standards - Metal and Flexible, and as indicated on the Contract Drawings. Provide duct material, gages, reinforcing, and sealing for operating pressures. Provide materials as manufactured by:

1. Ductmate.

2. Nordfab Systems, Inc.

3. McGill Airflow Corporation.

4. Or approved equal.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with the instructions of the manufacturer.

B. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.

C. Install alignment tolerance shall be at least plus or minus 1/8-inch or in accordance with manufacturer's installation alignment requirements, whichever is more stringent.

D. Duct Sizes are inside clear dimensions.

E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

F. Use double nuts and lock washers on threaded rod supports.

G. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

H. Do not use flexible duct to change direction.

I. Provide suitable duct sleeve for duct entrance through the building wall. Sleeve shall seal the space between the duct and the wall framing.

END OF SECTION

SECTION 15941

LOUVERS AND DAMPERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fixed louvers.

B. Combination louvers.

C. Dampers.

D. Accessories.

1.2 RELATED SECTIONS

A. Division 15 - Mechanical

1.3 REFERENCES

A. AMCA 500 - Test Method for Louvers, Dampers, and Shutters

B. ASTM E90-90 - Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

C. NFPA 70 - National Electrical Code

1.4 SUBMITTALS

A. Submit as directed in the Contract Documents.

B. Product Data: Provide data on louvers including curves for air performance, air leakage, and electrical characteristics and connection requirements. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level. Submit color charts with colors to be selected by the OWNER.

C. Operation and Maintenance Data: Submit operation and maintenance manuals as directed in the Contract Documents.

1.5 PROJECT RECORD DOCUMENTS

A. Submit as directed in the Contract Documents.

B. Record actual locations of air outlets and inlets.

1.6 QUALITY ASSURANCE

A. Test and rate louver performance in accordance with AMCA 500.

1.7 WARRANTY

A. Equipment shall be warrantied for a period of one year from date of startup.

PART 2 PRODUCTS

2.1 LOUVERS

A. Unit:

1. Louvers and dampers shall be as indicated on contract drawings. Manufacturer: Greenheck (basis of design), Dowco, Ruskin, or approved equal.

B. Fixed Generator Intake Louver (Greenheck Model EH601 or approved equal).

1. Fabrication:

a. Frame shall be minimum .08-inch extruded aluminum, 6-inch deep.

b. Blades shall be horizontal rain resistant style minimum .08-inch extruded aluminum. Spacing shall be approximately 2-inch oc. Blade spacing.

2. Accessories:

a. All components shall be kynar coated finish. Color selection by OWNER.

b. Bird screen shall be 3/4-inch .051-inch flattened expanded aluminum in frame.

C. Generator Intake Damper (Greenheck Model VCD-43 or approved equal).

1. Fabrication:

a. Frame shall be .125-inch formed aluminum, 5-inch deep.

b. Blades shall be extruded aluminum air foil type with opposed blade action.

c. Seals shall be provided for blades and jambs.

d. Bearings shall be synthetic sleeve type.

e. Operators shall be electric fast acting (15 seconds or less) two position actuator in a aluminum housing, spring loaded to open or close as indicated on the contract drawings, 120V, and 2 SPST internal auxiliary position indicating switches. Honeywell model MS4120F1204 or approved equal.

2. Accessories:

a. All components shall be mill finish.

D. Fixed Generator Exhaust and pump room intake Louver (Greenheck Model ESD-435 or approved equal).

1. Fabrication:

a. Frame shall be minimum .08-inch extruded aluminum, 4-inch deep.

b. Blades shall be drainable design minimum .08-inch extruded aluminum. Spacing shall be approximately 3.25-inch oc. at 37.5 degree spacing.

2. Accessories:

a. All components will be kynar coated finish. Color selection by OWNER.

b. Bird screen shall be 3/4-inch .051-inch flattened expanded aluminum in frame.

E. Generator Exhaust Damper (Greenheck Model BD-300 series or approved equal).

1. Fabrication:

a. Frame shall be minimum 24 gauge galvanized steel.

b. Blades shall be aluminum.

c. Seals shall be provided for blades.

d. Bearings shall be synthetic sleeve type.

2. Accessories:

a. All components shall be mill finish.

F. Combination Fixed/Adjustable Louver (Greenheck Model ECD-401 or approved equal).

1. Fabrication:

a. Frame shall be .125-inch formed aluminum, 4-inch deep.

b. Blades shall be .08-inch extruded aluminum. Spacing shall be approximately 4-inch oc. at 45 degrees. Drainable design.

c. Seals shall be provided for blades and jambs.

d. Bearings shall be synthetic sleeve type or bronze oil impregnated.

e. Operators shall be electric fast acting (15 seconds or less) two position actuator in a aluminum housing, spring loaded to close, 120V, and 2 SPST internal auxiliary position indicating switches. Honeywell model MS4120F1204 or approved equal.

2. Accessories:

a. All components shall be kynar coated finish. Color selection by OWNER.

b. Bird screen shall be 3/4-inch .051-inch flattened expanded aluminum in frame.

G. Pump Room Intake Damper (Greenheck Model ICD-45 or approved equal).

1. Fabrication:

a. Frame shall be .125-inch formed aluminum, 5-inch deep and thermally broken.

b. Blades shall be extruded aluminum air foil type with opposed blade action and insulated thermally broken airfoil type. Blades shall be polyurethane foam insulated.

c. Seals shall be provided for blades and jambs.

d. Bearings shall be synthetic type.

e. Operators shall be electric fast acting (15 seconds or less) two position actuator in a aluminum housing, spring loaded to close, 120V, and 2 SPST internal auxiliary position indicating switches. Honeywell model MS4120F1204 or approved equal.

2. Accessories:

a. All components shall be mill finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that space is ready for installation of units and openings are as indicated on Shop Drawings.

C. Verify that proper power supply is available.

3.2 INSTALLATION

A. Install in accordance with manufacturer’s instructions.

B. Caulk and seal unit to provide moisture-proof installation.

C. Install alignment tolerance shall be at least plus or minus 1/8 inch or in accordance with manufacturer's installation alignment requirements, whichever is more stringent.

D. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

END OF SECTION

SECTION 15985

INSTRUMENTATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This section defines the minimum requirements for the supply and installation of Instrumentation/Field Devices included in the Work for this contract.

B. The various field-mounted instrumentation devices shall be supplied, installed, calibrated, commissioned, and placed in proper working order to form a complete and operational system. The CONTRACTOR shall be responsible for the proper function of all components. The Electrical Contractor shall be responsible for interconnections only. The instruments shall include, but not be limited to, instrumentation such as transmitters, switches, and sensors and equipment such as controllers, displays, and analyzers.

C. The Contract Documents indicate the major components and the functional features required of the instruments and do not necessarily contain or indicate all components required to accomplish the necessary results or to interface equipment. All necessary devices, parts, equipment, and accessories, whether indicated or not, shall be properly coordinated, supplied, and installed in accordance with the intent of this specification. This shall include, but not limited to, installation labor and supervision, enclosures for electronics, instrument or device covers, conduit and fittings, mounting hardware and supports, and valves (i.e., isolation, drain/vent, balancing, etc.).

D. Additional information, such as operating range, units of measure, suggested mounting, orientation, local indication, etc., may be indicated in other specification sections or on the Contract Drawings. Any item, material, or detail not specified or indicated shall be determined by the supplier and shall be subject to approval.

1.2 RELATED SECTIONS

A. Division 16 - Electrical

1.3 REFERENCES

A. NEMA, National Electrical Manufacturers Association:

1. ICS 1 - General Standards for Industrial Control Systems.

2. ICS 2 - Standards for Industrial Control Devices, Controllers, and Assemblies.

3. ICS 6 - Enclosures for Industrial Controls and Systems.

4. Standards Publication 250.

B. NFPA 70, National Fire Protection Association, Inc. - National Electrical Code.

C. UL Underwriters Laboratories Inc.

1.4 PROGRESS SUBMITTALS

A. It is the CONTRACTOR's responsibility to provide submittals as specified and in a timely manner so that they can be reviewed, approved and the instruments purchased as required for other submittals and the project schedule.

B. Submittals that are returned "Rejected" to the CONTRACTOR must be resubmitted in a timely manner. Rejecting a submittal does not release the CONTRACTOR from the responsibility of maintaining the project schedule.

C. The CONTRACTOR shall provide progress submittals in the order presented below, unless instructed otherwise by the ENGINEER in writing. Providing submittals out of order may result in the delay of its review by the ENGINEER until the required preceding submittals are provided. The CONTRACTOR will be responsible for any impact to the project cost or schedule because of the incorrect submittal.

D. The CONTRACTOR responsible for supplying the instruments shall provide a progress submittal titled "Instrument Data." The submittal shall contain an instrument list, instrument data sheets and descriptions of instrument model numbers as described below.

1. Provide an Instrument List based on schedule list provided in article 3.5, as a Microsoft Word document.

2. Provide instrument data sheets with pertinent data **clearly highlighted or outlined** that illustrates the proposed equipment complies with the specification and provides all required features. This includes pictures, ranges, materials of construction, dimensions, et cetera. Standard data sheets with no markups indicating the proposed equipment may be Rejected.

3. Provide exact manufacturer part/model numbers. Provide ordering information that breaks down a model number to illustrate the specific features and options of the proposed instrument unless this information is provided on the data sheet discussed in item 2 above.

4. Provide manufacturer installation data. The data should indicate how to mechanically install and electrically wire each instrument. The documentation shall clearly indicate how external wiring is terminated at the instrument and how those termination points are labeled. If necessary, the CONTRACTOR shall generate the data.

5. This submittal may consist of multiple submittals if all instruments cannot be determined at the same time. Each time a submittal is issued the instrument list provided should be a marked revision of the previous one so that the list provided in the last submittal, therefore, the final revision number, shows all instruments for the project.

E. The ENGINEER must approve the associated "Instrument Data" submittal prior to procurement of an instrument. The only exceptions will be purchases that are authorized, in writing by the ENGINEER, to be purchased prior to the submittal approval.

F. The CONTRACTOR responsible for wiring the instruments shall provide a progress submittal titled "Instrument Wiring Diagrams" for any instruments that are <u>not</u> being wired to a new control panel that is being fabricated for this project. All drawings shall be 8½-inch by 11-inch, 11-inch by 17-inch or 22-inch by 34-inch in size and created using the latest version of AutoCAD unless instructed otherwise, in writing, by the ENGINEER.

1. This includes instruments that are being wired to existing equipment or control panels.

2. This includes instruments that wire to new control panel that are provided as part of a packaged system.

G. The CONTRACTOR responsible for supplying the instruments shall provide a progress submittal titled "Instrument User Manuals" consisting of a bound document containing manufacturer user manuals that describe the setup, operation, programming, parts list, calibration procedures and maintenance of the instruments being provided on the project. Copies of manufacturer's manuals shall consist of original manufacturer documents or clear, 2-sided copies.

H. Submittal acceptance by the ENGINEER does not relieve the CONTRACTOR of the responsibility to insure the instruments provided fully meet the requirements of the specifications and the control system.

1.5 CLOSEOUT SUBMITTALS

A. The CONTRACTOR that originally submitted "Instrument Data" and "Instrument Wiring Diagrams" described above shall provide as-built versions of the documents titled "As-built Instrument Data" and "As-built Instrument Wiring Diagrams." These submittals will consist of updated progress submittals described above. All closeout instrument-wiring diagrams shall be reissued with the indication "As-built" in the drawing revision block.

B. If the progress submittal of the "Instrument Data" constitutes as-built data, the CONTRACTOR may indicate this to the ENGINEER in writing instead of providing a set of documentation identical to that which was previously submitted. Instrument drawings, however, must be resubmitted even if there are no changes because they must be provided with a title block revision indicating "as-built."

C. The CONTRACTOR responsible for calibrating the instruments shall provide a submittal titled "Instrument Calibration Data" that contains a listing of instrument tag numbers with an indication of final calibration data. The data shall include, but not be limited to, analog signal spans, calibration spans in engineering units, alarm set points and, when appropriate, sensor position information (e.g., probe insertion distance).

D. The CONTRACTOR responsible for commissioning the instruments shall provide a submittal titled "Instrument O&M Manual." It shall describe recommended preventative or routine maintenance procedures for the instrumentation provided on the project. It should not reproduce calibration procedures provided in the manufacturer's documentation but should clearly direct the reader to the document and the pertinent section of that document.

E. The CONTRACTOR responsible for installing the instruments shall provide a submittal titled "Instrument Plan Drawings" consisting of drawings indicating the final location of instruments after startup of the system. The drawings may be "as-built" versions of project drawings or newly generated drawings. In either case, the drawing title blocks must be marked "as-built."

F. The CONTRACTOR responsible for supplying the instruments shall provide standard manufacturer's warranties for all instruments. The CONTRACTOR shall complete original warranty forms in the OWNER's name and register them with the manufacturer.

1.6 QUALITY ASSURANCE

A. Conform to NFPA 70, National Electrical Code.

B. Furnish products listed and classified by UL as suitable for purpose specified and shown.

C. Qualifications:

1. Manufacturer must be a company specializing in manufacturing the equipment of this Section with minimum 5 years of experience.

2. Installer must be a contractor specializing in performing the work of this section with minimum 3 years of experience.

D. Testing: Provide manufacturers standard product testing unless indicated otherwise.

E. Delivery, Handling and Storage:

1. Delivery of Materials: No materials shall be shipped without the written consent of the ENGINEER upon review of all submittal and testing information. The associated CONTRACTOR is responsible to inspect all materials received for size, quality, and quantity against the approved shop drawings.

2. Handling of Materials: The CONTRACTOR responsible for supplying the instruments shall carefully handle all products. Any component that is dropped, dented, or damaged by the CONTRACTOR or as a result of delivery or storage shall not be incorporated into the final assembly. The CONTRACTOR at his expense shall replace the component.
3. Storage of Materials: All materials shall be stored in the original package of the manufacturer whenever possible. The products shall be labeled. They shall be stored in a covered, dry location until installation.

F. Conflict of Documentation:

1. Anything relative to instrumentation mentioned in this section of the specification and not shown on the drawings, or not mentioned in this section of the specification and shown on the drawings shall be of like effect as if shown or mentioned in both.

PART 2 - PRODUCTS

2.1 GENERAL

A. External power available shall be 115 VAC + 10 percent (104 to 127 VAC), single phase, 60 hertz. The device supplier, for any unit requiring closer voltage regulation or a different voltage, shall furnish a suitable regulator or power supply.

B. All device electronics shall automatically (no human intervention required) return to normal operation and accurate calibration upon restoration of electric power after an interruption in service.

C. Unless otherwise required for a specific application, analog field signals shall be 4 – 20 mA DC.

D. Unless noted otherwise, all device flanges and adapters shall be carbon steel. All wetted materials shall be stainless steel. Where applicable, drain/vent valves shall be stainless steel.

E. Where applicable, sensor fill fluid shall be silicone oil.

F. All individually mounted instruments shall be capable of accepting standard U.S. size conduit fittings. Minimum size shall be one-half inch (1/2").

G. Operating Environment:

1. Continuously operating (24 hours per day, 7 days per week) facility.

2. Non-hazardous industrial environment (damp, humid, dust, and dirt).

3. Indoor temperature range of 0 degrees C (32 degrees F) to 40 degrees C (104 degrees F) and relative humidity 10 percent to 95 percent non-condensing.

4. Outdoor temperature range of -29 degrees C (-20 degrees F) to 60 degrees C (150 degrees F) and relative humidity 0 percent to 95 percent non-condensing.

5. Electrical classification is General Purpose except where noted on the drawings or in the specification.

H. All scales shall be in standard U.S. engineering units. Units of measure, calibration, and local indication, where applicable, shall typically be:

1.	Fluid flow	GPM or MGD
2.	Air and/or gas flow	SCFM or SCFH
3.	Fluid level	Feet and Inches
4.	Pressure	PSIG
5.	Temperature	Degrees Fahrenheit

2.2 TRANSMITTERS

A. Flow Indicating Transmitter (FIT)

1. Each unit shall be a differential pressure sensing device intended to continuously:

a. Measure the rate of liquid flow through a venturi or across an orifice plate.

b. Locally indicate the flow rate in million gallons per day (MGD).

c. Transmit the flow rate data, via a 4-20 mA signal, to a PLC in million gallons per day (MGD).

2. Each unit shall be complete with diaphragms, remote mounted electronics (housed in a NEMA 4 enclosure), local indication (minimum 4 digit LCD display), manifold, valves (i.e., isolation, drain/vent, and balancing), and all necessary accessories and mounting hardware.

3. Unit(s) shall be as manufactured by Rosemount, Model 3051 (3051S1CD2A2F12A1ABAM5DW).

B. Pressure Indicating Transmitter (PIT)

1. Each unit shall be a capacitance type pressure sensing device intended to continuously:

a. Measure the pressure at sample point.

b. Locally indicate the pressure in pounds per square inch (psi) and feet of head.

c. Transmit the pressure data, via a 4-20 mA signal, to a PLC in pounds per square inch (psi) and feet of head.

2. Each unit shall be complete with diaphragm, integral electronics (housed in a NEMA 4 enclosure), local indication (minimum 4 digit LCD display), valves (i.e., isolation and drain/vent), and all necessary accessories and mounting hardware.

3. Unit(s) shall be as manufactured by Rosemount, Model 3051 (3051S1CG4A2F12A1ABAM5DW).

2.3 SWITCHES

A. Unless otherwise noted or required for a specific application, all switches shall be snap-action, single pole, double throw (SPDT) rated for 10 amps at 120 VAC minimum.

B. Pressure switches to be installed in hazardous areas shall be NEMA 7 and all others shall be NEMA 4.

C. Pressure switches supplied for pump discharge shall be located in the discharge line immediately following the pumps and prior to any valve or obstruction in the line, unless otherwise specified or shown on the Contract Drawings.

D. All pressure switches shall be normally open contacts, which close when the switch is activated.

E. No mercury shall be utilized in any device; all wetted parts shall be certified for use with drinking water.

F. Provide all switches with isolation and drain valve as part of the system, approved by the ENGINEER.

G. The CONTRACTOR and equipment manufacturer shall coordinate the installation and operating range of pressure switches.

H. Pressure or Differential Pressure

1. Bourdon Tube Type

a. Field adjustable operating set point and reset point(s).

b. Field adjustable deadband.

c. Include visible on/off indication.

d. Differential Pressure Units shall be as manufactured by Square D Class 9012 GGW-4.

e. Pressure Units shall be as manufactured by Square D Class 9012 GAW-6.

f. Designated as pressure switch high (PSH) or pressure switch low (PSL). Both high and low functions may be combined into a single device (PSHL). Differential pressure shall be designated as either high (PDSH) or low (PDSL).

2.4 PRESSURE GAUGES

A. Pressure gauge indicating feature shall have 4 1/2-inch minimum diameter faces. Pressure gauge range and scale graduations shall be in combination of psi and feet of water as follows:

1. Gauge range shall be able to read a minimum of 1.5 times the maximum pump discharge pressure.

2. Compound gauges shall be able to read -30 in. Hg to 60 psi.

3. Inner scale: 5-psi figure intervals, with graduating marks every 1-psi.

4. Outer scale: 10-foot figure intervals, with graduating marks every 5 feet.

B. Gauge shall be mounted to allow ease of access and readability by OWNER. Gauges shall be labeled to indicate location of pressure indicated.

C. Mechanical Gauges shall be compound gauges on the pump suction lines with the ability to read negative pressures and standard gauges on pump discharge lines.

D. Provide all gauges with isolation and drain valve as part of the system, approved by the ENGINEER.

E. All pressure gauge units shall be:

1. Direct mechanical indicating dial gauge.

2. Provided with one (1) diaphragm seal each.

3. Provided with one (1) isolating ball valves each.

F. Manufacturer:

1. Ashcroft.

2. Helicoid.

3. Or Approved Equal.

PART 3 - EXECUTION

3.1 GENERAL

A. An identification tag shall be supplied and installed on each field device by the device supplier. Tags shall be engraved stainless steel or other weather resistant material such as brass. Tags shall be permanently attached to the device.

3.2 SHIPPING AND STORAGE

A. All devices shall be shipped, stored, and handled in accordance with the written instructions of the original equipment manufacturer (OEM). Items that require a controlled environment for storage, such as microprocessors, moisture and/or cold temperature sensitive devices, and display units, shall be appropriately warehoused prior to installation in a dry, heated space. The OWNER reserves the right to inspect the storage facilities at any time.

B. The CONTRACTOR shall receive, confirm contents of, catalog, and store all devices until required on-Site.

3.3 INSTALLATION

A. All instruments shall be removable for repair and/or calibration without shutting down the piece of equipment and/or the process.

B. The supplier of the device shall be responsible for providing all brackets, steelwork, and/or supports necessary for proper mounting. Plain carbon steel shall be cleaned, primed, and finish painted. Stainless steel shall not be painted.

C. All brackets, steelwork, and supports shall be supplied complete with required anchors, nuts, bolts, and washers necessary to mount and align the various instruments per the manufacturer's recommendations.

D. All devices shall be installed in strict accordance with the instructions of the field device manufacturer and the Approved Shop Drawings. The installer shall not deviate from such instructions without prior written approval of the manufacturer. The installer shall not deviate from approved Shop Drawing details without prior written approval of the engineering representative of the OWNER.

E. Coordinate the installation of instruments furnished under this Technical Specification Section with equipment furnished under other Sections, with equipment furnished by other Contractors, and with all Work trades.

F. The device supplier shall furnish all interconnecting piping and tubing required for the proper operation of instruments. All lines shall be parallel or perpendicular to the walls and floor. Slope sample lines so that they drain. Through type sensor drain lines shall be piped to and empty into an appropriate drain, gutter, or sewer. All required penetrations through walls and floors shall be made weather-tight with a suitable material similar in appearance to the surrounding area.

G. Each device shall be installed so that no mechanical, piping, or electrical connection strain is imparted on the device itself.

H. Handrail shall not be used for mounting or supporting instruments.

I. Locally mounted instruments shall be pedestal mounted, bracket mounted, or enclosure mounted on the nearest permanent steelwork, masonry, or concrete. Except for in-line sensors, devices shall not be supported by process piping. Field mounted devices shall not be attached to any tank or vessel unless brackets have been provided on the structure specifically for that purpose.

J. Instruments that include local indication shall be installed in readily accessible locations and the display shall be plainly visible. Mount the display at approximately five feet (5' +), or 1524 mm, above the operating floor or platform. Readily accessible shall be defined as reachable without the use of ladders and/or without having to climb over or crawl under obstacles such as equipment, piping, or structures.

3.4 CALIBRATION, COMMISSIONING, AND STARTUP

A. The device supplier shall perform calibration of field sensors and/or instruments as directed by ENGINEER or OWNER. The supplier shall furnish all necessary test and calibration equipment and shall provide evidence of the proper calibration of each device. Adjust instrument set points as directed by OWNER.

B. Demonstrate, to the satisfaction of the OWNER, that each and every device meets the functional requirements under all possible operating conditions.

C. The CONTRACTOR shall provide the services of a manufacturer's representative to provide one startup visit and one 8-hour training session to the OWNER for each instrument specified. The timing of this training shall be coordinated with the OWNER.

3.5 INSTRUMENTATION LIST

Instrument Number	Instrument Name	Instrument Manufacturer	Instrument Model Number	Instrument Serial Number	Instrument Calibration Range	SCADA Calibration Range	Instrument Output Range
031-FE-001	Station Flow Element						
031-FIT-001	Station Flow	Rosemount	3015S1CD2A2F12A1ABAM5DW		0 - 205.23"H2O	0 - 70 MGD	4-20mA
031-LIT-002	Tank Level	Rosemount	3015S1CG4A2F12A1ABAM5DW		2.9 - 47.9 FT	0 - 45 FT	4-20mA
031-PIT-003	Station Suction Pressure	Rosemount	3015S1CG4A2F12A1ABAM5DW		0 - 100 PSI	0 - 100 PSI	4-20mA
031-PIT-004	Station Discharge Pressure	Rosemount	3015S1CG4A2F12A1ABAM5DW		0 - 200 PSI	0 - 200 PSI	4-20mA
031-PIT-005	Tank Fill Line Pressure	Rosemount	3015S1CG4A2F12A1ABAM5DW		0 - 100 PSI	0 - 100 PSI	4-20mA
031-PDSH-011	Pump 1 Differential Pressure Switch	Square-D	9012 GGW-4		15 PSI	---	---
031-PSH-011	Pump 1 Discharge Pressure Switch	Square-D	9012 GAW-6		40 PSI	---	---
031-PDSH-021	Pump 2 Differential Pressure Switch	Square-D	9012 GGW-4		15 PSI	---	---
031-PSH-021	Pump 2 Discharge Pressure Switch	Square-D	9012 GAW-6		40 PSI	---	---
031-PDSH-031	Pump 3 Differential Pressure Switch	Square-D	9012 GGW-4		15 PSI	---	---
031-PSH-031	Pump 3 Discharge Pressure Switch	Square-D	9012 GAW-6		40 PSI	---	---
031-PDSH-041	Pump 4 Differential Pressure Switch	Square-D	9012 GGW-4		15 PSI	---	---
031-PSH-041	Pump 4 Discharge Pressure Switch	Square-D	9012 GAW-6		40 PSI	---	---

END OF SECTION

SECTION 15990

TESTING, ADJUSTING, AND BALANCING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Measurement of final operating condition of HVAC systems.

1.2 RELATED SECTIONS – NOT USED

1.3 ALLOWANCES – NOT USED

1.4 REFERENCES

A. ASHRAE 111 - Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-conditioning, and Refrigeration Systems.

B. SMACNA - HVAC Systems Testing, Adjusting, and Balancing.

C. AABC - National Standards for Total System Balance.

1.5 SUBMITTALS

A. Submit submittals in accordance with these Specifications.

B. Field Reports: Indicated deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.

C. Prior to commencing work, submit report forms or outlines indicating adjusting, balancing, and equipment data required.

D. Submit draft copies of the report for review prior to final acceptance of Project. Provide final copies for the ENGINEER and for inclusion in operating and maintenance manuals.

E. Provide reports in letter-size binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

F. Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty prior to commencing system balance.

1.6 PROJECT RECORD DOCUMENTS

A. Submit under provisions of with these Specifications.

B. Record actual locations of flow measuring stations and balancing valves and rough setting.

1.7 QUALITY ASSURANCE

A. Perform total system balance in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance.

1.8 QUALIFICATIONS

A. Agency: Company specializing in the testing, adjusting, and balancing of systems specified in this Section with minimum 5 years of experience.

B. Perform work under supervision of a registered Professional Engineer experienced in performance of this work and licensed in the State of New York.

1.9 SEQUENCING

A. Sequence Work to commence before and after completion of systems and schedule completion of Work before Substantial Completion of the Project.

1.10 SCHEDULING

A. Schedule Work with the ENGINEER a minimum of 72 hours prior to commencement of testing.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that the systems are complete and operable prior to beginning work. Ensure the following conditions:

1. Systems are started and operating in a safe and normal condition.
2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Air coil fins are cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage is minimized.

12. Service and balance valves are open.

B. Submit field reports. Report defects and deficiencies noted during performance of services, which prevent system balance.

C. Commencement of work means acceptance of existing conditions.

3.2 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to the ENGINEER to facilitate checks during testing.

B. Provide additional balancing devices as required.

3.3 INSTALLATION TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of initial testing results for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of initial testing results to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.4 ADJUSTING

A. Ensure recorded data represents actual measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witness by the OWNER.

3.5 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities (at site altitude).

B. Measure air quantities at air inlets and outlets.

C. Use volume control devices to regulate air quantities only to the extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

D. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

E. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

F. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

G. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

H. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

I. Where modulating dampers are provided, take measurements and balance at extreme conditions.

J. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 12.5 Pa positive static pressure near the building entries.

3.6 SCHEDULES

A. Equipment Requiring Testing, Adjusting, and Balancing:

1. Fan systems

B. Report Forms:

1. Title Page:

a. Name of Testing, Adjusting, and Balancing Agency

b. Address of Testing, Adjusting, and Balancing Agency

c. Telephone number of Testing, Adjusting, and Balancing Agency

d. Project Name

e. Project Location

f. Project Architect

g. Project ENGINEER

h. Project CONTRACTOR

i. Project altitude

j. Report data

2. Summary Comments:

a. Design versus final performance

b. Notable characteristics of system

c. Description of systems operation sequence

d. Summary of outdoor and exhaust flows to indicate amount of building pressurization

e. Nomenclature used throughout report

f. Test conditions

3. Instrument Lists:

a. Instrument

b. Manufacturer

c. Model number

d. Serial number

e. Range

f. Calibration date

4. Electric Motors:

a. Manufacturer

b. Model/Frame

c. HP/BHP

d. Phase, voltage, amperage; nameplate, actual, no load

e. RPM

f. Service Factor

g. Starter size, rating, heater elements

5. Air Moving Equipment:

a. Location

b. Manufacturer

c. Model number

d. Serial number

e. Arrangement/Class/Discharge

f. Air flow, specified and actual

g. Return air flow, specified and actual

h. Outside air flow, specified and actual

i. Total static pressure (total external), specified and actual

j. Inlet pressure

k. Sheave Make/Size/Bore

l. Number of Belts/Make/Size

m. Fan RPM

6. Return Air/Outside Air Data:

a. Identification/location

b. Design air flow

c. Actual air flow

d. Design return air flow

e. Actual return air flow

f. Design outside air flow

g. Actual outside air flow

h. Return air temperature

i. Total Static Pressure (total external), specified and actual

j. Required mixed air temperature

k. Actual mixed air temperature

l. Design outside/return air ratio

m. Actual outside/return air ratio

7. Duct Traverse:

a. System zone/branch

b. Duct size

c. Area

d. Design velocity

e. Design air flow

f. Test velocity

g. Test air flow

h. Duct static pressure

i. Air temperature

j. Air correction factor

8. Duct Leak Test:
    a. Description of ductwork under test
    b. Duct design operating pressure
    c. Duct design test static pressure
    d. Duct capacity, air flow
    e. Maximum allowable leakage duct capacity times leak factor
    f. Test apparatus:
        1. Blower
        2. Orific, tube size
        3. Orifice size
        4. Calibrated
        5. Test static pressure
    g. Test orifice differential pressure
    h. Leakage
9. Flow Measuring Station:
    a. Identification/number
    b. Location
    c. Size
    d. Manufacturer
    e. Model number
    f. Serial number
    g. Design flow rate
    h. Design pressure drop
    i. Actual/final pressure drop
    j. Actual/final flow rate
    k. Station calibrated setting

10. Terminal Unit Data:

    a. Manufacturer

    b. Type, constant, variable, single, dual duct

    c. Identification/number

    d. Location

    e. Model number

    f. Size

    g. Minimum static pressure

    h. Minimum design air flow

    i. Maximum design air flow

    j. Maximum actual air flow

    k. Inlet static pressure

11. Air Distribution Test Sheet:

    a. Air terminal number

    b. Room number/location

    c. Terminal type

    d. Terminal size

    e. Area factor

    f. Design velocity

    g. Design air flow

    h. Test (final) velocity

    i. Test (final) air flow

    j. Percent of design air flow

END OF SECTION

SECTION 16010

ELECTRICAL CONDITIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section includes minimum general requirements for the CONTRACTOR's electrical Work.

1.2 SCOPE OF WORK

A. CONTRACTOR shall provide all labor, materials, equipment, services and incidentals necessary and required to complete a fully operational project as described in Section 01010, Summary of Work, shown on the Contract Drawings, and specified in the Work Related Sections and herein. This task includes supply, installation, connection, commissioning and startup all project electrical equipment and systems.

1.3 RELATED SECTIONS

A. The project electrical Work shall be as specified in the following related sections:

1. Section 01010 – Summary of Work

2. Division 16 – Electrical

1.4 REFERENCE CLAUSES

A. The Information for Bidders, Proposal Form, Agreement, General Conditions, Special Conditions, Related Sections and the Contract Drawings are all a part of the CONTRACTOR'S Work. CONTRACTOR shall refer to them for further instructions pertaining to his Work.

B. "CONTRACTOR," "The CONTRACTOR," "This CONTRACTOR," "EC," as used herein and in Division 16000 sections, means the Electrical Contractor.

C. "Furnish," "Supply," "Install," "Construct," "Furnish and Install," "Supply and Install" as used herein and in the Work Related Sections, means a workable, complete and industry-acceptable electrical supply and installation by CONTRACTOR.

1.5 REFERENCES

A. All electrical Work supplied and installed by CONTRACTOR shall comply with the most recent requirements of all applicable codes, standards, guides and practices issued by the following organizations at the time of bidding:

1. ANSI – American National Standards Institute

2. IEEE – Institute of Electrical and Electronic Engineers

3. NEMA – National Electrical Manufacturer's Association

4. NFPA – National Fire Protection Association

5. OSHA – Occupational Safety and Health Act

6. UL – Underwriter's Laboratories, Inc.

7. IBC – International Building Code

8. IFC – International Fire Code

9. ICEA – Insulated Cable Engineers Association

10. All state and local authorities having jurisdiction

B. In the event of conflict between the codes and standards listed by the above organizations, the more stringent regulation shall govern and be considered the minimum standard.

C. In the event of conflict between Division 16000 section specifications and the standards listed by the above organizations, the standard shall govern unless specifications are in excess of standards.

1.6 QUALITY ASSURANCE

A. CONTRACTOR'S Work quality of shall be in accordance with the industry accepted practices.

B. CONTRACTOR shall have in place an approved Quality Assurance Program for the project Work execution.

C. CONTRACTOR shall be inspected periodically by OWNER, Contract Administrator and/or their representative solely for the purpose of determining general quality of Work and not for any other purpose.

D. Guidance will be offered to CONTRACTOR in interpretation of the Contract Drawings and Division 16000 specifications to assist him in carrying out the Work as intended.

E. OWNER and ENGINEER guidance and inspections do not relieve CONTRACTOR from his responsibility to maintain the approved quality assurance program for the Project.

1.7 HEALTH AND SAFETY

A. CONTRACTOR shall abide by OWNER'S Health and Safety requirements and all applicable OSHA rules and regulations.

1.8 SITE COORDINATION

A. CONTRACTOR shall be responsible for coordinating the electrical Work with other trades working on this facility and with the facility OWNER. See Section 01010, Summary of Work and Section 01311, Coordination With Owner's Operations for further details.

B. Furnish and file with the local authorities having jurisdiction all drawings and information required by them in connection with the Work.

C. Obtain all permits, licenses, and inspections and pay all legal and proper fees and charges pertaining to the Project.

D. CONTRACTOR shall note that existing facility operation takes precedence over any construction activities. If CONTRACTOR does not accomplish this requirement, ENGINEER reserves the right to demand such changes as necessary to avoid further operational interference and such changes shall not be considered an extra expense to the Project and OWNER. See Coordination with OWNER'S Operations Section for further details.

E. When CONTRACTOR has occasion to Work on the existing plant equipment, OWNER shall de-energize the equipment. Both OWNER and CONTRACTOR shall tag and lockout the equipment. When newly installed equipment reaches the state of being ready to be energized, CONTRACTOR shall tag and lockout the equipment.

1.9 ON-SITE WORK SUPERVISION

A. CONTRACTOR shall provide the services of a full-time, on-Site, experienced and competent supervisor to direct and oversee the Work until successful completion of the Project.

B. The on-Site supervisor shall have sufficient experience to run a project construction within a facility similar to the Project Site.

C. OWNER'S and ENGINEER'S guidance, directions and inspections do not relieve CONTRACTOR from his responsibility to supervise the Work.

1.10 CONTRACTOR'S EMPLOYEES

A. All CONTRACTOR'S employees shall be skilled in the Work performed to which they shall be assigned.

B. Any CONTRACTOR'S employee incompetent or careless shall be removed from the Project when directed by OWNER and/or ENGINEER.

1.11 WORK AREAS

A. The project electrical Work shall be at the Guenther Pumping Station as shown on the Contract Drawings.

1.12 ELECTRICAL CLASSIFICATION OF WORK AREAS

A. The electrical classification of Work areas is non-hazardous, general purpose.

1.13 SCHEDULE

A. CONTRACTOR shall, in liaison with OWNER and ENGINEER, develop a project schedule to ensure, without delays, the sequencing, demolition, installation, testing, and commissioning of the project electrical Work. Refer to Section 01300 of these specifications for further details.

B. The CONTRACTOR'S schedule shall be based on the requirements of the Scope of Work and Limitation and Constrains Sections, and it shall not allow for interruption of the existing facility operation.

C. The CONTRACTOR'S schedule shall be subject to OWNER'S review and approval.

D. CONTRACTOR shall maintain the OWNER-approved schedule until successful completion of the Project.

1.14 SITE PROGRESS MEETINGS

A. CONTRACTOR shall attend all construction progress meetings as scheduled by OWNER and ENGINEER.

B. CONTRACTOR shall be prepared to discuss the schedule progress, Work quality, interference with other Work or the existing facility operation, health and safety, and any other project-related issues.

1.15 CONFLICT OF DOCUMENTATION

A. Anything mentioned in the reference sections and not shown on the drawings, or not mentioned in the sections and shown on drawings shall be of like effect as if shown or mentioned in both.

B. In event of any conflict between the drawings and the reference sections or between the sections or between the drawings, CONTRACTOR shall bring it to ENGINEER'S attention for review and resolution. This shall be done during CONTRACTOR'S bidding stage. CONTRACTOR shall be liable for any Work performed without following this procedure, and shall remedy the situation at his own expense as requested by ENGINEER at no cost to the Project and OWNER.

1.16 CONTRACT DRAWINGS

A. The Contract Drawings are engineering type drawings showing principal engineering design elements and they do not intend to be used as detailed construction drawings.

B. The Contract Drawings show the project equipment recommended equipment layouts, interconnecting wiring routing, and the equipment, conductor and raceways sizes based on the project preliminary data available to the ENGINEER during the Project design phase.

C. The Contract Drawings do not cover every detail of the proposed installation or variation for construction or provide for every possible installation contingency.

D. The Contract Drawings do not provide the equipment point-to-point field interconnecting wiring and shall not be additionally furnished. CONTRACTOR shall develop these drawings during the construction shop drawings phase, when the Project progresses to the point that the CONTRACTOR-supplied equipment wiring termination information becomes available.

E. Unless dimensioned, the Contract Drawings show the approximate size and location of the equipment, devices, and building services. The CONTRACTOR shall determine exact equipment locations and sizes based on actual equipment supplied and field conditions.

F. Standard details, where shown, are included in the Contract Drawings to establish the minimum quality of the installation. Actual field conditions may require that the components be arranged in a different manner.

G. When "HOLD" appears on a Contract Drawing, the CONTRACTOR shall understand that this only applies to the actual construction or fabrication. The Contract Bid Price shall include all costs to provide the Work.

H. The Contract Drawings as provided to CONTRACTOR, shall be deemed adequate for completion of all project electrical Work. It is expected that the project electrical Work will be supervised and performed by qualified persons familiar with electrical equipment, electrical construction practices, and health and safety requirements within an operational facility similar to the Project Site.

I. Immediately after the Contract is signed, CONTRACTOR shall obtain a complete set of the Contract Drawings from ENGINEER. CONTRACTOR shall verify, confirm and/or review the Contract Drawings based on the actual Site conditions and the actual equipment data. CONTRACTOR shall make all necessary

and required corrections to the Contract Drawings, and have the corrected Contract Drawings reviewed and approved by ENGINEER prior to commencing construction

J. CONTRACTOR shall be liable for any Work performed without following the above submittal procedure at no cost to the Project and OWNER.

K. Review of the corrected Contract Drawings by ENGINEER shall not relieve CONTRACTOR from responsibility for errors or omissions.

1.17 SHOP DRAWINGS

A. CONTRACTOR'S required shop drawings shall be based on the actual Site conditions and the actual equipment data. As a minimum, the required shop drawings shall include, but not be limited to the following documents:

1. Equipment layout plans, elevations and dimensions.

2. Wiring routing plans and raceways.

3. Equipment installation details.

4. Panel layouts and bill of materials.

5. Equipment/System schematic diagrams.

6. Equipment/System point-to-point field wiring connection diagrams showing identified cable bundles, cable conductors and all terminating points.

7. Required construction calculations (an example of the required construction calculation is wire sizing and raceway fill calculation).

8. All CONTRACTOR-supplied equipment and system documentation (further details on this submittal requirements are under the heading "O&M Manual").

B. CONTRACTOR shall review the Shop Drawing Submittal Section for requirements of the CONTRACTOR'S Submittals procedure.

C. All CONTRACTOR'S shop drawings shall be subject to ENGINEER'S review and approval prior to commencing the project equipment/system installation. CONTRACTOR shall be liable for any Work performed without following the submittal procedure at no cost to the Project and OWNER.

D. Review of the Shop Drawing submittals by ENGINEER shall not relieve CONTRACTOR from responsibility for errors or omissions.

1.18 CONSTRUCTION DRAWINGS

A. All CONTRACTOR-corrected Contract Drawings and all CONTRACTOR-provided Shop Drawings shall form a complete set of the Project Construction Drawings.

1.19 RECORD DRAWINGS

A. CONTRACTOR shall maintain a complete set of Record Drawings for construction as further defined in Special Conditions of the Contract.

1.20 SUBMITTALS

A. CONTRACTOR'S submittal requirements are detailed in the Special Conditions of the Contract, as modified by special requirements as may be specified in Division 16 specification Sections. The following is a brief summary of the minimum documents, which shall be submitted to ENGINEER for review and approval prior to commencing construction:

1. OWNER-approved Work Schedule showing all construction tasks, milestones, duration and sequences.

2. All corrected Contract Drawings.

3. All required Shop Drawings.

4. All CONTRACTOR-supplied equipment and material manufacturer's data including, but not be limited to: catalog cuts, equipment data sheets, approval drawings, performance and test data, recommended spare parts, installation manuals, operation and maintenance manuals, and the like.

1.21 OPERATION AND MAINTENACE MANUAL

A. Operating and Maintenance (O&M) Manuals shall be submitted as described under Section 01781 for every electrical equipment/system component supplied by CONTRACTOR. As a minimum, the O&M Manual shall contain the following:

1. Overall index.

2. Index tabs to designate different section of the supplied equipment and systems.

3. All factory and field equipment and system inspection and test reports. This information is subject to ENGINEER'S review and approval.

4. All ENGINEER-approved as-built equipment/system documentation including equipment plans, elevations, dimensional data, weights, material lists, schematics, wiring and connection diagrams, and the like.

5. All recommended spare parts.

6. All equipment installation, operation and maintenance instructions.

B. On completion of the Project, CONTRACTOR shall supply three (3) complete sets of operating and maintenance (O&M) manuals to OWNER.

1.22 GUARANTEE

A. CONTRACTOR shall guarantee all his Work including equipment, material and installation for a period of one (1) year after acceptance by OWNER. Any defects occurring within the guarantee period shall be rectified as quickly as possible by the CONTRACTOR, at no expense to the Project and OWNER.

B. The above general guarantee shall not act as a waiver of any specified guarantee or special equipment guarantee covering a greater length of time.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. All CONTRACTOR-supplied project electrical equipment and material shall be as specified in Division 16000 sections. At a minimum, the following shall apply:

1. All electrical equipment and material shall be new, standard industrial grade, UL approved for application, and UL labeled. No commercial or residential components will be acceptable. No custom components will be acceptable, unless approved by Engineer.

2. Unless noted otherwise, all current carrying components shall be Copper (Cu).

3. All electrical components and assemblies (i.e., motor starters) shall be standard NEMA rated or NEMA/IEC rated. Strictly IEC rated equipment will not be accepted.

4. All electrical components shall be properly selected, sized and approved for application.

5. Each piece of material and equipment shall be installed with the name or trademark of the manufacturer, rating nameplate, and approval label as required.

6. Before ordering any materials or equipment, CONTRACTOR shall verify all measurements at the Project Site and shall be responsible for the correctness of the same. No extra charge or compensation shall be allowed on account of difference between actual dimensions and the measurements derived from the Contract Drawings.

7. CONTRACTOR shall be responsible to check with equipment manufacturers as to the physical size of their equipment. The CONTRACTOR must ensure that the equipment will fit in the space allocated on the Contract Drawings. Any extra expense due to equipment not fitting in the allocated space shall be borne by the CONTRACTOR.

8. CONTRACTOR shall instruct manufacturers as to the maximum shipping size of equipment that shall permit moving the equipment through available accesses.

PART 3 EXECUTION

3.1 WORK INSTALLATION GUIDELINES – GENERAL REQUIREMENTS

A. All project electrical components including motor control centers, panels, transformers, wiring raceways, and the like shall be installed as follows:

1. Adhere to the location shown on the drawings as far as possible.

2. Do not install electrical and control equipment at locations where process equipment is to be installed.

3. Do not obstruct walkways, or makes inaccessible or hard equipment maintenance access.

4. All Work shall be constructed plumb square, level, and true to lines and surfaces indicated, in a neat, substantial, and workmanlike manner, and in such a way as to properly serve the purpose indicated.

5. Assure that the space about all electrical equipment is in accordance with NEC.

3.2 RIGGING AND LIFTING

A. CONTRACTOR shall provide all project-required electrical equipment rigging and lifting equipment and tools.

B. All project electrical equipment rigging and lifting shall be by qualified and experienced personnel.

C. All lifts shall be planned and shall be in accordance with the equipment manufacturer's instructions and in close communication with OWNER.

3.3 COMMISSIONING AND STARTUP

A. Equipment and system inspection, testing and commissioning shall be as described in Division 16000 sections. As a minimum, the following shall apply:

1. CONTRACTOR shall inspect, test, and commission all Work done under this Contract and prove to the ENGINEER that all equipment is correctly connected and adjusted to fully function as intended under all operation conditions.

2. CONTRACTOR shall provide all tools and qualified personnel for commissioning.

3. CONTRACTOR shall rectify all deficiencies found during commissioning at no cost to the Project and OWNER.

4. During the process equipment start-up, CONTRACTOR shall provide tools and a qualified electrician for one week of the start-up assistance as required.

3.4 TRAINING

A. CONTRACTOR shall be responsible for training of OWNER'S personnel assigned to operate and maintain the project equipment and systems.

B. CONTRACTOR'S training activities shall start at the beginning of the Project in liaison with OWNER and ENGINEER. The actual training shall begin during the final stages of the construction Work and prior to the Project completion.

C. At a minimum, CONTRACTOR'S training activities shall include the following:

1. Provide a team of experienced and qualified personnel for training purposes.

2. Develop OWNER-approved training plan and schedule.

D. At a minimum, the training shall cover the following:

1. Review of the Project O&M Manual.

2. Review of each Project equipment and system description, operation, maintenance, spare parts, troubleshooting, and health and safety issues.

3. Review and practicing of the Project equipment/system proposed and recommended operation.

3.5 PROJECT CLOSE-OUT

A. Clean-up: At completion of Work, and prior to the final acceptance inspection, CONTRACTOR shall remove all temporary structures, scaffolding, tools, surplus material, waste and trash from the Work areas leaving the Project Site clean and ready for immediate use.

B. Touch-up Painting: At completion of Work, and prior to the final acceptance inspection, CONTRACTOR shall "touch-up" all minor nicks and scratches on all equipment enclosures and raceways, with two coats of matching paint.

C. Restoration: At completion of Work, and prior to the final acceptance inspection, CONTRACTOR shall provide all properly compacted backfill, grade, and refinish to match the existing surrounding areas.

D. Demolished and Loose Equipment: At completion of the Work, and prior to the final acceptance inspection, CONTRACTOR shall demonstrate to OWNER that all Project demolished and loose equipment have been returned to OWNER, and safely and securely placed in the designated areas.

E. As-Built Documentation: Upon completion of Work, and prior to the final acceptance inspection, CONTRACTOR shall provide all specified as-built documentation including Record Drawings and O&M manuals as specified.

F. Final Acceptance: Acceptance of individual Work items is described in Division 16000 sections. At the Project closeout, but prior to CONTRACTOR leaving the Site, the final acceptance of Work shall be by CONTRACTOR, OWNER and ENGINEER. During this inspection CONTRACTOR shall demonstrate to OWNER and ENGINEER that the entire electrical construction has been completed as specified. The inspection shall result in either a written CONTRACTOR'S Final Acceptance Report signed by OWNER and ENGINEER or a written Punch List containing items requiring corrections, followed by another inspection. This process shall be repeated until OWNER and ENGINEER sign off the Final Acceptance Report.

END OF SECTION

SECTION 16030

TEMPORARY ELECTRICAL CONNECTIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section includes minimum requirements for the Project temporary electrical connections as required and necessary to maintain the existing facility's electrical, control, and instrumentation systems in full working order during the Project demolition and new construction work.

B. This Work shall be in close communication with OWNER and ENGINEER, and it shall include provisions of all required and necessary adequate temporary sources of power, power distribution, interconnecting wiring and grounding.

1.2 RELATED SECTIONS

A. The following sections relate to this section Work:

1. Section 01010 - Summary of Work

2. Division 16 - Electrical

1.3 REFERENCES

A. CONTRACTOR'S Work shall comply with the latest requirements of all applicable codes, standards, guides, practices and local regulations pertaining to the job at the time of bidding, and it shall carry approval labels where required. As a minimum, the following shall apply:

1. ANSI/NFPA 70 – National Electrical Code

2. NFPA 70E – Standard for Electrical Safety in the Workplace

3. ANSI/IEEE C2 – National Electrical Safety Code

4. OSHA CER 1910, Subpart S – Electrical General, Parts 1 and 2

1.4 SITE CONDITIONS

A. Scheduling: CONTRACTOR shall carry out the temporary connection work so as to avoid interference with the OWNER'S operations in the existing facilities.

B. Notifications: At least 48 hours prior to the commencement of the temporary connection work, the CONTRACTOR shall notify the OWNER in writing of the proposed schedule. The CONTRACTOR shall not start the temporary connection work without permission of the OWNER. Special detailed coordination with the OWNER must be adhered to for any work involving shutdowns or modifications affecting pump station or tank operation.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. All equipment and materials used for this section shall be as specified in the applicable Work Related Sections and Work References.

PART 3 EXECUTION

3.1 EXAMINATION

A. Existing electrical, control, and instrumentation information on the Contract Drawings is based on the Project preliminary data available to the ENGINEER during the Project design phase, therefore, the CONTRACTOR shall field verify all required and necessary information pertaining to this section before any work is begun.

3.2 PREPARATION

A. To prepare for the Project demolition and new construction work, CONTRACTOR shall disconnect all effected existing power, control and instrumentation wiring and/or associated power sources, and to provide all necessary and required temporary electrical connections. This task requires CONTRACTOR'S provision of all necessary and required 7-day 24-hours temporary power sources, power distribution equipment, and interconnecting wiring and grounding.

3.3 TEMPORARY ELECTRICAL CONNECTION WORK

A. As a minimum, CONTRACTOR'S Work shall be as per requirements NEC Article 527, Temporary Installations and as specified in the applicable Work Related Sections and References.

3.4 EXTENSION OF EXISTING ELECTRICAL WORK

A. All wiring that is necessary to maintain full operation of the OWNER'S facility shall be reconnected either temporarily or, wherever possible, with the new permanent installation.

END OF SECTION

ASECTION 16040

ELECTRICAL DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section includes minimum requirements for the Project electrical demolition work.

1.2 RELATED SECTIONS

A. The following sections relate to this section Work:

1. Section 02030 - Demolition

2. Division 16 - Electrical

1.3 REFERENCES

A. CONTRACTOR's Work shall comply with the latest requirements of all applicable codes, standards, guides, practices and local regulations pertaining to the job at the time of bidding, and it shall carry approval labels where required. As a minimum, the following shall apply:

1. ANSI/NFPA 70 – National Electrical Code

2. NFPA 70E – Standard for Electrical Safety in the Workplace

3. ANSI/IEEE C2 – National Electrical Safety Code

4. OSHA CER 1910, Subpart S – Electrical General, Parts 1 & 2

1.4 SITE CONDITIONS

A. Scheduling: CONTRACTOR shall carry out the temporary connection work so as to avoid interference with the OWNER's operations in the existing facilities.

B. Notifications: At least 48 hours prior to the commencement of the temporary connection work, the CONTRACTOR shall notify the OWNER in writing of the proposed schedule. The CONTRACTOR shall not start the temporary connection work without permission of the OWNER. Special detailed coordination with the OWNER must be adhered to for any work involving shutdowns or modifications affecting operation.

C. Examination:

1. Examine existing condition requirements and required demolishing activities based on Contract Documents, existing Record Documents and existing conditions in liaison with OWNER and ENGINEER.

2. The beginning of demolition shall mean CONTRACTOR accepts existing conditions and operations.

D. Protection:

1. CONTRACTOR shall supply and install temporary protective covering for all existing equipment that may be damaged during demolition. The covering shall be of sufficient protection to prevent debris, dust, moisture, etc. from entering and/or damaging the existing equipment.

2. Perform all demolition work to prevent damage or injury to structures, occupants thereof, and adjacent features which might result from falling debris or other causes, and so as not to interfere with the use, and free safe passage to and from adjacent structures.

3. Closing or obstruction of roadways, sidewalks, and passageways adjacent to the Work will not be permitted, and all operations shall be conducted with a minimum interference to these ways.

4. Repair damage to facilities to remain or to any property belonging to the OWNER or occupants of the facilities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. The demolition work shall be as shown on the Contract Documents and as specified.

B. All demolished materials and equipment removed from the existing facility shall become the property of the CONTRACTOR, except where the OWNER has identified and marked for his use.

C. All materials and equipment marked by the OWNER to remain his shall be carefully removed (salvaged) by the CONTRACTOR, so as not to be damaged, and shall be cleaned, loaded onto trucks provided by the OWNER, and delivered to a location determined by the OWNER.

D. The CONTRACTOR shall dispose of all demolition materials, equipment, debris, and all other items not marked by the OWNER to remain as his, off the Site and in conformance with all existing applicable laws and regulations.

E. Surfaces of walls, floors, ceilings, or other areas which are exposed by any of the removals specified herein, and which will remain as architecturally finished surfaces shall be repaired and re-finished by the CONTRACTOR with the same or matching materials as the existing adjacent surface or as may be otherwise approved by the ENGINEER.

3.2 ELECTRICAL DEMOLISHING

A. Electrical demolition shall consist of the removal of the existing transformers, switchgear, switchboards, panelboards, control panels, motors, conduits and wires, and all miscellaneous electrical equipment as shown, specified, or required to perform the Work.

B. All existing electrical equipment to be removed shall be removed with such care as may be required to prevent unnecessary damage, to keep existing systems in operation, and to maintain the integrity of the grounding systems.

C. Switchboards and panelboards shall be removed or modified as shown. Switchboards to be removed shall be disconnected and dismantled, and all components shall be disposed of off the Site. Circuit breakers and other control equipment on modified switchboards that will no longer be used shall be removed unless otherwise shown or specified. All new openings cut into the modified switchboard panels shall be cut square and dressed smooth to the dimensions required for the installation of the new equipment.

D. Conduits and wires shall be abandoned or removed where shown. All wires in abandoned conduits shall be removed, salvaged, and stored. Abandoned conduits concealed in floor or ceiling slabs, or in walls, shall be cut flush with the slab or wall at the point of entrance. The conduits shall be suitably plugged and the area repaired in a flush, smooth, approved manner. Exposed conduits and their supports shall be disassembled and removed from the Site. Repair all areas of work to prevent rust spots on exposed surfaces.

E. Where shown or otherwise required, wiring in underground duct systems shall be removed. All such wiring shall be salvaged and stored as specified. The CONTRACTOR shall verify the function of all wiring before disconnecting and removing it. Ducts which are not to be reused shall be plugged where they enter buildings and made watertight.

F. Where shown, direct-burial cable shall be abandoned. Such cable shall be disconnected at both ends of the run. Where it enters a building or structure, the cable shall be cut back to the point of entrance. All openings in buildings for entrance of abandoned direct-burial cable shall be patched and made watertight.

G. Wall switches, receptacles, lighting fixtures, motor starters, and other miscellaneous electrical equipment shall be removed and either salvaged to the OWNER or disposed of off Site by the CONTRACTOR.

H. The CONTRACTOR shall provide the OWNER with certified documentation proving that all Poly-Chlorinated Biphenyl's (PCBs) were disposed of in accordance with local, state, and nation regulations.

3.3 ALTERATIONS AND CLOSURES

A. Alterations shall conform to all applicable Specifications, the Contract Drawings, and the directions and approvals of the ENGINEER.

B. Where alterations require cutting or drilling into existing floors, walls, and roofs, the holes shall be repaired in an approved manner. The CONTRACTOR shall repair such openings with the same or matching materials as the existing floor, wall, or roof or as otherwise approved by the ENGINEER. All repairs shall be smoothly finished unless otherwise approved by the ENGINEER.

C. Openings in existing concrete slabs, ceiling, masonry walls, floors, and partitions shall be closed and sealed as shown or otherwise directed by the ENGINEER. New Work shall be keyed into the existing Work in an acceptable manner. In general, use of the same or matching materials as the existing adjacent surface should be utilized. The finished closure shall be a smooth, tight, sealed, permanent closure acceptable to the ENGINEER.

3.4 CLEAN-UP

A. CONTRACTOR shall remove from the job site all debris resulting from the demolition operations as it accumulates and shall dispose it off at no extra cost to the owner as per Federal and State environmental standards and guidelines.

END OF SECTION

SECTION 16060

GROUNDING AND BONDING

PART 1 GENERAL

1.1 SECTION INCUDES

A. This section includes minimum requirements for the Project grounding and bonding.

1.2 RELATED SECTIONS

A. The following sections relate to this section Work:

1. Section 01010 – Summary of Work

2. Division 16 – Electrical

1.3 REFERENCES

A. CONTRACTOR'S Work shall comply with the latest requirements of all applicable codes, standards, guides, practices and local regulations pertaining to the job at the time of bidding, and it shall carry approval labels where required. As a minimum, the following shall apply:

1. ANSI/NFPA 70 – National Electrical Code

2. ANSI/IEEE C2 – National Electrical Safety Code

3. OSHA CER 1910, Subpart S – Electrical General, Parts 1 and 2

4. IEEE 142-2007 – IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems

5. IEEE 81-2012 – IEEE Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Grounding System

1.4 SUBMITTALS FOR REVIEW

A. CONTRACTOR shall submit, for approval, catalog cut sheets for each type of conductor and component, and also connection method proposed for this section Work.

1.5 SUBMITTALS FOR CLOSEOUT

A. On completion, CONTRACTOR shall submit, for approval, all test results and all accurately completed Project record drawings showing actual location and routing of all Project ground rods and underground conductors.

PART 2 PRODUCTS

2.1 MATERIAL – GENERAL REQUIREMENTS

A. All grounding system materials shall be UL-approved copper components.

2.2 GROUND RODS

A. Ground rods shall be minimum 5/8-inch-diameter copper-clad steel, minimum 8 feet in length.

2.3 CONDUCTORS

A. All buried ground conductors shall be stranded soft drawn annealed uncoated bare copper.

B. All exposed ground shall be stranded soft drawn annealed uncoated copper with green PVC insulation and nylon jacket (THHN/THWN).

C. All exposed instrumentation ground shall be stranded soft drawn annealed uncoated copper with green PVC insulation, a yellow stripe, and an overall nylon jacket (THHN/THWN).

D. All ground conductor sizes shall be as indicated on the Contract Drawings or per the NEC.

PART 3 EXECUTION

3.1 INSTALLATION – GENERAL REQUREMENTS

A. Complete installation of the Project grounding and bonding in accordance with NEC Article 250, and as shown on Drawings. Install all grounding system components in accordance with the manufacturer's recommendations.

B. CONTRACTOR shall coordinate the installation of buried ground conductors and conductor PVC sleeves with the other trades located on the Project Site.

C. All metallic conduit, electrical enclosures, motor frames, pump bases, metallic devices, fences surrounding electrical equipment, and the like shall be grounded as shown on the Contract Drawings and required by NEC.

D. All non-metallic raceways shall be provided with a system ground conductor sized according to the NEC and included within the raceway.

E. All ground connections shall be compressed or bolted. Soldering shall not be allowed.

F. Where ground conductor passes through floors, slabs, walls, etc. and are not encased in a raceway, the CONTRACTOR shall furnish and install schedule 80 PVC sleeves of the required size and length. Sleeve to extend a minimum of 2 inches beyond finished floor, slab wall, etc. to provide physical protection. Under electrical equipment, stub-up shall be flush with finish floor. Minimum size of the sleeve shall be 3/4 inch.

G. Bond jumpers shall be installed where required to maintain grounding continuity. Jumpers shall be sized per the NEC.

H. Provide a ground conductor to all miscellaneous building services such as light switches, receptacles, and light fixtures.

I. Ground conductors shall not be installed in any way that would interfere with electrical, mechanical, or piping equipment removal.

J. Only conditioned power (isolated) exposed ground risers shall use green with yellow stripe conductors.

K. Underground connections for the grounding system shall be compression type or exothermic welded type (Cadweld or equal).

L. Verify that final backfill and compaction has been completed before driving ground rods.

M. Copper main ground conductor to be buried a minimum of 30 inches below finished grade with sufficient slack to prevent damage.

N. Unless noted otherwise on the Contract Drawings or required by local building code, the top of permanent ground rods shall be driven to a depth of 12 inches below finished grade.

O. Any buried ground conductor damaged during construction shall be repaired by the CONTRACTOR before being covered over.

P. For all new construction or existing building work, ground conductors shall be bonded to the base of the nearest building column.

Q. Grounding conductors installed inside the building shall be neatly clipped and installed as inconspicuously as possible. In routing to the nearest building ground, the conductor should be attached to structural steel and avoid interference with any other equipment.

R. Where the ground conductor bonds to building steel, the location shall not be subject to mechanical damage. Bond points shall be accessible for inspection.

S. Where connections have been made to structural steel, the CONTRACTOR shall furnish and apply touch-up-paint to match the steel finish. The steel surface shall be adequately prepared by wire brush cleaning.

T. Upon completion of ground system installation, perform a ground test utilizing the 4 point method defined in IEEE 81. If the resistance is greater than 5 Ohms, drive two more ground rods and repeat test.

3.2 CLOSEOUT

A. On completion, CONTRACTOR shall demonstrate to the OWNER and ENGINEER that the Project grounding and bonding has been supplied and installed as specified.

END OF SECTION

SECTION 16070

HANGERS AND SUPPORTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Conduit and equipment supports.

B. Anchors and fasteners.

1.2 REFERENCES

A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association.

B. NFPA 70 - National Electrical Code (NEC)

1.3 SUBMITTALS

A. See appropriate sections of Front End Specifications and Division 1 for submittal procedures.

B. Product Data: Provide manufacturer's catalog data for fastening systems.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.4 DESCRIPTION

A. Description: Steel channel, fittings, and anchors used to support various electrical devices and equipment racks.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Materials and components shall be inspected for damage and physical defects.

B. Materials and components shall be stored in accordance with manufacturer's recommendations.

1.7 WARRANTY

A. Full warranty against defects in materials and workmanship for 2 years after final acceptance by the OWNER, including all parts, labor, and expenses.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Superstrut.

B. Thomas & Betts Corporation: www.thomasandbetts.com.

C. Threaded Rod Company: www.threadedrod.com.

D. Unistrut.

E. B-Line.

F. Or equal.

2.2 MATERIALS

A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type as indicated on the Drawings, adequate to carry the loads of equipment and conduit, including weight of wire in conduit.

B. Supports: Fabricated of structural steel or formed steel members; galvanized.

C. Anchors and Fasteners:

1. Corrosion resistant galvanized or cadmium plated steel.

2. Do not use powder-actuated anchors.

3. Concrete Structural Elements: Use expansion anchors.

4. Steel Structural Elements: Use beam clamps or steel spring clips.

5. Concrete Surfaces: Use expansion anchors.

6. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts.

7. Solid Masonry Walls: Use expansion anchors or preset inserts.

8. Sheet Metal: Use sheet metal screws.

9. Wood Elements: Use wood screws.

D. Formed Steel Channel:

1. Materials and Finishes: Provide galvanized, adequate corrosion resistance.

2. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.

E. Steel Spring Clips:

1. Product: B-Line manufactured by Cooper.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify wall, ceiling, and rafters are suitable to accept channel and anchors.

B. Verify all channels, fasteners, anchors and miscellaneous are suitable for the application.

3.2 INSTALLATION

A. Provide the project equipment and wiring support as shown on the drawings and specified and as required to adequately and securely support electrical system components and to complete the installation.

B. Install products in accordance with manufacturer's instructions.

C. Install hangers and supports as required in a neat and workmanlike manner, as specified in NECA 1.

D. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.

E. Obtain permission from ENGINEER before drilling or cutting structural members.

F. Fabricate supports from structural steel or steel channel. Rigidly weld support members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

G. Install surface-mounted cabinets and panelboards with minimum of four anchors.

H. In wet and damp locations use aluminum or stainless steel channel supports to stand cabinets and panelboards 1/4 inch off wall.

I. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

3.3 FIELD QUALITY ASSURANCE

A. Verify all supports are securely anchored and fastened.

B. Verify all supports are level and square.

3.4 DEMONSTRATION

A. On completion, demonstrate to the ENGINEER that all project hangers and supports have been supplied and installed as specified.

END OF SECTION

SECTION 16075

ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Nameplates and labels.

B. Wire and cable markers.

C. Conduit markers.

1.2 RELATED SECTIONS

A. Section 01010 – Summary of Work

1.3 REFERENCES

A. NFPA 70 - National Electrical Code (NEC)

1.4 SUBMITTALS

A. See appropriate sections of Front End Specifications and Division 1 for submittal procedures.

B. Product Data: Provide catalog data for nameplates, labels, and markers.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Quality Assurance. Include instructions for storage, handling, protection, examination, preparation and installation of product.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Brady Corporation: www.bradycorp.com.

B. Seton Identification Products: www.seton.com/aec.

C. HellermannTyton: www.hellermanntyton.com.

D. Substitutions: Not permitted.

2.2 NAMEPLATES AND LABELS

A. Nameplates: Engraved three-layer laminated plastic, black letters on white background.

B. Locations:

1. Each electrical distribution and control equipment enclosure.

2. Communication cabinets.

3. Fire alarm panel.

C. Letter Size:

1. Use 3/16 inch letters for identifying individual equipment and loads.

2. Use 1/2 inch letters for identifying grouped equipment and loads.

D. Labels: Embossed adhesive tape, with 3/16 inch black letters on white background. Use only for identification of individual wall switches and receptacles and control device stations.

2.3 WIRE MARKERS

A. Manufacturers:

1. Brady.

2. Seton.

3. Hellermann Tyton.

4. Substitutions: Not permitted.

B. Description: Vinyl or cloth self-adhesive type wire markers.

C. Locations: Each conductor at panelboard gutters, pull boxes, outlet boxes, junction boxes, and motor control center and each load connection.

D. Legend:

1. Power and Lighting Circuits: Branch circuit or feeder number indicated on Drawings.

2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on Drawings.

2.4 CONDUIT MARKERS

A. Manufacturers:

1. Brady.

2. Seton.

3. Substitutions: Not permitted.

B. Description: Vinyl self-adhesive type.

C. Location: Furnish markers for each conduit longer than 20 feet.

D. Spacing: 20 feet on center.

E. Color:

1. 480 Volt System: orange with black letters.

2. 208 Volt System: yellow with black letters.

3. Communication/Video Systems: blue with white letters.

F. Legend:

1. 480 Volt System: 480 Volts.

2. 208 Volt System: 208 Volts.

3. Communication/Video System: Name of System

2.5 UNDERGROUND WARNING TAPE

A. Manufacturers:

1. Brady.

2. Seton.

3. Substitutions: Not permitted.

B. Description: 6-inch wide plastic tape, detectable type colored red with suitable warning legend describing buried electrical lines.

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive nameplates and labels.

3.2 INSTALLATION

A. Provide electrical identification (nameplates and labels) means for all specified electrical equipment/device enclosures and panels, and wiring as shown on the Drawings, specified and as required to complete the installation.

B. Install nameplates and labels parallel to equipment lines.

C. Secure nameplates to equipment front using stainless steel screws.

D. Secure nameplates to inside surface of door on panelboard that is recessed in finished locations.

E. Identify underground conduits using underground warning tape. Install one tape per trench at 18 inches below finished grade.

3.3 FIELD QUALITY ASSURANCE

A. Verify provision of the project identification means.

3.4 DEMONSTRATION

A. On completion, demonstrate to the ENGINEER that all project electrical identification has been provided as specified.

END OF SECTION

SECTION 16110

CONDUIT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section includes minimum requirements for the project conduit in all project locations as shown on the drawings and as specified herein. This shall include all project conduit and fittings, and all associated pull and junction boxes.

1.2 RELATED SECTIONS

A. The following sections relate to this section Work:

1. Section 01010 – Summary of Work
2. Division 16 – Electrical

1.3 REFERENCES

A. CONTRACTOR's Work shall comply with the latest requirements of all applicable codes, standards, guides, practices and local regulations pertaining to the job at the time of bidding, and it shall carry approval labels where required. As a minimum, the following shall apply:

1. NEC/NFPA 70 – National Electrical Code
2. NFPA 70E – Standard for Electrical Safety in the Workplace
3. ANSI/IEEE C2 – National Electrical Safety Code
4. OSHA CER 1910, Subpart S – Electrical General, Parts 1 & 2
5. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated, and C80.5 – Rigid Aluminum Conduit
6. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
7. NEMA TC 2 – Electrical Polyvinyl Chloride (PVC) Conduit (EPC-40 and EPC-80)
8. NEMA TC 3 – PVC Fittings for Use with Rigid PVC Conduit and Tubing
9. Underwriters Laboratories Inc. (UL)

1.4 SUBMITTALS FOR REVIEW

A. CONTRACTOR shall submit, for approval, catalog cuts for all conduit, fittings and boxes proposed for this section Work.

B. CONTRACTOR shall submit, for approval, all revised Contract Drawings showing revised conduit routing and conduit sizes as specified in Section 16010, Electrical Conditions.

1.5 SUBMITTALS FOR CLOSEOUT

A. On completion, CONTRACTOR shall submit, for approval, accurately completed project Record Drawing showing actual location and routing of all exposed and all concealed conduit work.

PART 2 PRODUCTS

2.1 MATERIAL - GENERAL REQUIREMENTS

A. Furnish products listed and classified by UL as suitable for purpose specified and shown.

B. Aboveground Interior installation: Use rigid metal conduit (unless otherwise noted), sizes as shown on the drawings and/or per NEC, 3/4-inch minimum size.

C. Above grade exterior and underground Installation: Use PVC coated rigid metallic conduit, sizes as shown on the drawings and/or per NEC, 3/4-inch minimum size.

2.2 RIGID METAL CONDUIT

A. NEC type RMC, rigid hot dipped galvanized steel conduit, complete with threaded conduit bodies, fittings and sealing fittings as required.

B. Conduit shall be furnished in manufacturer's standard lengths. Each conduit length shall be threaded on both ends. One end shall have a factory coupling and the other end shall have a plastic thread-protecting sleeve. Each length shall bear the UL label and the manufacturer's name.

C. Conduit sizes shall be as required by NEC and/or shown on the Drawings, 3/4-inch minimum size.

D. Conduit fittings and bodies shall match the conduit system.

E. Approved Manufacturers: Allied Tube & Conduit, Wheatland Tube, Republic or approved equal.

2.3 RIGID METAL CONDUIT, PVC-COATED

A. NEC type RMC, rigid hot dipped galvanized steel conduit, PVC-coated complete with PVC-coated threaded conduit bodies, fittings and sealing fittings as required.

B. Conduit shall be furnished in manufacturer's standard lengths. Each conduit length shall be threaded on both ends. One end shall have a factory coupling and the other end shall have a plastic thread-protecting sleeve. Each length shall bear the UL label and the manufacturer's name.

C. Conduit fittings and bodies shall match the conduit system.

D. Approved Manufacturers: Plasti-Bond or approved equal.

2.4 LIQUID- TIGHT FLEXIBLE METAL CONDUIT

A. NEC type LFMC, interlocked steel helically wound strip type with PVC liquid-tight jacket.

B. Approved Manufacturers: Sealtite or approved equal.

2.5 BOXES

A. All boxes shall be installed as specified in Section 16130.

2.6 HANGERS AND SUPPORTS

A. All Hangers and supports shall be installed as specified in Section 16070.

2.7 UTILITY MARKING TAPE

A. All underground conduits shall be designated with a red color, corrosion resistant detectable utility marking tape. The tape shall be 35-mil thick solid foil core encased in a protective jacket.

B. Approved Manufacturers: Magnatec; Terra Tape, Sentry Line 620 or approved equal.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. The conduit quantity, size, and routings, as shown on the Contract Drawings shall not be considered absolute. This information, as indicated on the Contract Drawings or in this specification, is based on preliminary engineering data available to ENGINEER during preparation of the Contract Documents. CONTRACTOR shall completely review all Contract Drawings, as specified in Section 16010, Electrical Conditions and as based on the equipment data and actual field conditions, and furnish all necessary project conduit as required.

3.2 INSTALLATION - GENERAL GUIDELINES

A. CONTRACTOR shall coordinate and properly schedule, so as not to cause project delays, with other trades the placement of conduits and/or sleeves in concrete or through walls, floors, and ceilings.

B. CONTRACTOR shall be responsible for all trenching, excavation, backfill, disposal of excess material, and restoration required to install all underground conduits and/or ductbanks. Work shall be completed in accordance with the Division 2 technical specification sections.

C. When indicated on the Contract Drawings, conduits passing through new walls, floors, and foundations shall be sleeved. Sleeves shall be either steel or PVC as indicated on the Contract Drawings, and, if necessary, shall be sealed with a fire stopping material similar in appearance to the surrounding area.

D. Core drill for individual conduits passing through existing concrete slabs or walls. In existing facilities, obtain authorization from OWNER before core drilling. Check existing drawings to locate possible existing embedded conduits. Seal spaces around new conduits with waterproof grout similar in appearance to the surrounding area.

E. Unless reusing existing conduit, all conduits, supports, hardware and the like shall be new materials.

F. All miscellaneous hardware such as nuts, bolts, screws, washers, etc. shall be furnished and installed by CONTRACTOR and shall be, at a minimum, either hot-dipped galvanized steel or zinc plated.

G. All metallic conduits shall be installed as a complete continuous system to NEC before any conductors are laid or pulled in. The conduits shall be installed so that a continuous grounding system will be maintained from the furthest point to the building grounding system.

H. Where any component of the conduit system is damaged prior to final acceptance by OWNER, this CONTRACTOR shall be required to replace or provide a new conduit at no expense to the project and OWNER.

I. To reuse existing conduit:

1. Remove all wire and cable from the conduit.

2. Pull rag swabs through the conduit to remove water and to clean the conduit prior to installing new conductors.

3. Repeat swabbing until all foreign matter is removed.

J. Embedded conduits shall be protected immediately (before concrete is placed) by installing polyethylene plugs, designed for this purpose, at each end. The plug shall not be removed until cable is ready to be installed.

K. Open ends of spare conduits shall be capped with a threaded steel bushing and a flat (solid) washer immediately after installation. The use of wooden plugs or duct tape shall not be allowed. Exact location of spare conduits shall indicate on the "Record" Contract Drawings.

L. A heavy-duty pull string shall be installed in each spare or empty conduit.

M. Whenever possible, there shall not be more than the equivalent of three quarter bends or 270° total between pull points such as conduits or pull boxes.

N. Rigid metal conduit that connects to metal enclosures or pull boxes shall use double lock nuts and a protective bushing. One lock nut shall be used on the outside and the second lock nut and bushing shall be utilized inside. The bushing must be screwed on fully before the lock nuts are set.

O. Rigid metal conduit shall be provided with grounding fittings as necessary to provide bonding connections.

P. Rigid metal conduit cut in the field shall have ends cut square. Cut ends shall be reamed to remove burrs and sharp edges. All field threads shall be cut to the same dimensions and taper as the factory cut threads.

3.3 UNDERGROUND INSTALLATION

A. CONTRACTOR shall coordinate all underground work with OWNER for possible interference with the existing underground facilities. All CONTRACTOR's underground work shall be reviewed and approved by OWNER prior to commencing construction. CONTRACTOR shall be liable for any work performed without following this procedure.

B. All underground conduit shall be buried to a depth of at least 24 inches below final grade unless shown otherwise on the drawings. A 6-inch wide red caution tape "BURIED ELECTRICAL LINE BELOW" shall be placed at a depth of 12 inches below the final grade the entire length of the underground line.

C. Where requested by OWNER, the utility marker tape shall be applied for the underground installation.

3.4 ROUTING AND SIZING

A. When the routing of conduits is shown on the Contract Drawings, this information is provided only as a guide and shall not be considered absolute. The Contract Drawings only indicate the approximate location of conduit installation. The CONTRACTOR shall determine exact locations by field verifying each route before beginning work.

B. The sizes of conduit indicated on the Contract Drawings are based on preliminary engineering data. The CONTRACTOR shall determine actual conduit sizes based on the outside diameter of the actual cable and wire supplied.

C. The quantity of conduits indicated on the Contract Drawings or in this specification is based on preliminary engineering data. The CONTRACTOR shall supply and install all conduits required to maintain the installation recommendations of NEC, IEEE, and the supplied equipment manufacturers.

D. Conduits shall not be smaller than the size required by the NEC for the conductors enclosed and shall be larger where so specified or indicated on the Contract Drawings.

E. Unless otherwise noted on the Contract Drawings as large radius (sweeps), all 90° conduit elbows shall be standard radius or field bent conduit with a radius of a standard elbow. To ease cable-pulling tensions, CONTRACTOR may elect to install large radius elbows.

F. No conduit shall be reduced in size in a ductbank or embedded conduit run.

G. Conduit shall not be embedded in concrete slabs and/or walls having a thickness of 6 inches or less.

H. When indicated in a standard detail on the Contract Drawings, conduit may be installed below a grade floor slab. CONTRACTOR shall excavate, bed the conduit in stone, cover the conduit with stone, and backfill.

I. Conduit may be embedded in concrete slabs and/or walls having a thickness of more than 6 inches. CONTRACTOR shall submit installation details for review by the ENGINEER. All embedded conduits shall have a minimum of 2 inches of concrete cover.

J. Exact location of conduit in slabs with respect to reinforcing shall be as directed by the ENGINEER. Crossing of conduit in a floor slab shall not be permitted except as approved by the ENGINEER.

K. All exposed conduits shall be installed parallel to or perpendicular to the building walls and ceiling unless otherwise indicated on the Contract Drawings.

L. All conduits and supports shall be installed so as not to interfere with normal passage of personnel, mobile equipment, and/or vehicles. Maintain a minimum headroom clearance of 8 feet.

M. To avoid possible injuries to operators and/or maintenance personnel, under no circumstance shall conduit be installed across the top of a floor surface.

N. Conduits shall be run to avoid adverse conditions such as heat and moisture and to avoid all materials and equipment of other trades. Conduits shall maintain a minimum clearance of 6 inches from all hot water pipes, flues, or any high temperature piping or ductwork. Should it be necessary to install conduits closer than this to hot water pipes, an insulating type covering shall be used to protect the conduit from high temperature.

O. Provide suitable fittings to accommodate expansion and/or deflection where conduits cross building expansion joints.

P. All exterior vertical conduit runs with an elevation change greater than 5 feet shall include proper conduit vents and drains.

Q. CONTRACTOR shall increase conduit size, as required, where wire size has been increased for voltage drop.

3.5 SEPARATION

A. In order to maintain a separation of electrical noise sources from signal and instrumentation cabling, the CONTRACTOR shall group cables within a conduit system according to IEEE standard 518 level designations.

1. Level 1: Analog signals of less than 50V. Digital signals of less than 15V.

2. Level 2: Analog signals greater than 50V. Control/switching circuits operated by less than 50V. Analog tachometer signals.

3. Level 3: Control/switching circuits operated by 50V or greater but less than 20 amps. AC feeders less than 20 amps.

4. Level 4: Power circuits of 0-1000V. Power circuits of 20-800A.

5. Level 5: Power circuits above 1000V. Power circuits above 800A.

3.6 LIQUID - TIGHT FLEXIBLE METAL CONDUIT

A. It shall be installed for the final conduit connection to all motors and any other device, such as valves or fans and the like, subject to movement or vibration.

B. The minimum length shall be 12 inches and the maximum length shall be 36 inches.

C. The size shall be the same as the conduit it is connected to. When connecting to a single device, such as a solenoid or limit switch, the final length of flexible conduit may be ½-inch diameter.

D. Proper terminations and bonding jumpers shall be used to maintain the integrity of the grounding system.

3.7 CONDUIT FITTINGS AND BOXES

A. CONTRACTOR shall install all conduit fittings and boxes as indicated on the Contract Drawing or where necessary to facilitate the installation of conductors and as required to meet NEC requirements for non-hazardous and hazardous locations.

B. All box conduit entry holes shall be cut, drilled, or punched. Torch cutting shall not be permitted. Holes shall be deburred from both sides.

C. All boxes shall be supported independently of all conduits and shall be secured in place.

3.8 SUPPORTS

A. CONTRACTOR shall be responsible for supply, proper application, installation, and location of all necessary, required and approved conduit system supports and hangers for a complete conduit system. This shall be provided as specified in Section 16070, Hangers and Supports.

B. The conduit supports shall be from the building structural steel members only. Do not support conduit from the pipe, duct, conduit, and the like. Do not burn or weld to structural members.

C. As a minimum, conduit supports shall be spaced as required by the NEC.

3.9 FIELD QUALITY CONTROL

A. Demonstration: On completion, demonstrate to ENGINEER that all project conduit and boxes have been supplied and installed as specified.

END OF SECTION

SECTION 16112

SURFACE RACEWAYS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface metal raceways.

B. Multi-outlet assemblies.

C. Wireways.

D. Wall duct.

1.2 RELATED SECTIONS

A. Section 01010 – Summary of Work

B. Division 16000 Sections

1.3 REFERENCES

A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association

B. NEMA WD 6 – Wiring Device Configurations

C. ANSI/NFPA 70 – National Electric Code (NEC)

D. Underwriters Laboratories (UL)

1.4 SUBMITTALS

A. See appropriate sections of Front End Specifications and Division 1 for submittal procedures.

B. Product Data – Provide dimensions, knockout sizes, and locations, materials, fabrication details, finishes, and accessories.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with NECA Standard of Installation

B. Maintain one copy of document on site.

1.6 QUALIFICATIONS

A. Manufacturer – Company specializing in manufacturing Products specified in this Section with minimum of 3 years of documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by UL as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.1 SURFACE METAL RACEWAY

A. Manufacturers:

1. Hubbell Incorporated.

2. Panduit Corporation.

3. Wiremold/Legrand.

4. Approved Equivalent.

B. Description – Sheet metal channel with fitted cover, suitable for use as surface metal raceway.

C. Size – As indicated on Drawings

D. Finish – Manufacturers recommended finish.

E. Fittings, Boxes, and Extension Rings – Furnish manufacturer’s standard accessories.

2.2 SURFACE NONMETAL RACEWAY

A. Manufacturers:

1. ABB Inc.

2. Panduit Corporation

3. Hubbell Incorporated.

4. Wiremold/Legrand.

5. Approved Equivalent.

B. Description – Plastic or Fiberglass channel with fitted cover, suitable for use as surface metal raceway.

C. Size – As indicated on Drawings.

D. Finish – Gray.

E. Fittings, Boxes, and Extension Rings – Furnish manufacturer’s standard accessories.

2.3 WIREWAY

A. Manufacturers:

1. Hoffman.

2. Eaton B-Line.

3. Panduit Corporation.

4. Approved Equivalent

B. Description – General purpose, oil tight, dust tight, and rain tight type wireway.

C. Knockouts – Manufacturer's Standard.

D. Size – As indicated on Drawings.

E. Cover – Screw Cover with full gasketing.

F. Connector – Slip in.

G. Fittings – Lay-in type with removable top; captive screws.

H. Finish – Rust inhibiting primer with ANSI Gray enamel Finish.

2.5 WALL DUCT

A. Manufacturers:

1. Hubbell Inc.

2. Schneider Electric.

3. Wiremold/Legrand.

4. Approved Equivalent.

B. Description – Sheet metal wall duct suitable for installation of x-ray cables with surface covers and accessories as indicated.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Use flat-head screws, clips, and straps to fasten raceway channel to surfaces. Mount plumb and level.

C. Use suitable insulating bushings and inserts at connections to outlets and corner fittings.

D. Wireway Supports – Provide suitable steel channel.

E. Ground and bond raceway and wireway under provisions of Section 16060.

END OF SECTION

SECTION 16120

WIRE AND CABLE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section includes minimum requirements for the Project wire and cable in all Project locations as shown on the drawings and as specified herein. This shall include all Project wire, cable, wiring identification and terminations.

1.2 RELATED SECTIONS

A. The following sections relate to this section Work:

1. Section 01010 – Summary of Work

2. Division 16 – Electrical

1.3 REFERENCES

A. CONTRACTOR'S Work shall comply with the latest requirements of all applicable codes, standards, guides, practices and local regulations pertaining to the job at the time of bidding, and it shall carry approval labels where required. As a minimum, the following shall apply:

1. ANSI/NFPA 70 – National Electrical Code

2. NFPA 70E – Standard for Electrical Safety in the Workplace

3. ANSI/IEEE C2 – National Electrical Safety Code

4. OSHA CER 1910, Subpart S – Electrical General, Parts 1 and 2

5. Underwriters Laboratories Inc. (UL)

1.4 SUBMITTALS FOR REVIEW

A. CONTRACTOR shall submit, for approval, catalog cuts for all wire and cable proposed for this section Work.

B. CONTRACTOR shall submit, for approval, all revised Contract Drawings showing revised wiring routing and wire sizes as specified in Section 16010, Electrical Conditions.

C. CONTRACTOR shall submit, for approval, all required interconnecting wiring termination drawings as specified in Section 16010, Electrical Conditions.

1.5 SUBMITTALS FOR CLOSEOUT

A. On completion, CONTRACTOR shall submit, for approval, accurately completed Project Record Drawing showing actual location, routing and termination details of all wire and cable work.

PART 2 PRODUCTS

2.1 MATERIAL - GENERAL REQUIREMENTS

A. All wire, cable and terminations for the Project shall be NEC compliant, UL-approved product.

2.2 FEEDER AND BRANCH CIRCUIT CABLE

A. Description: NEC general wiring type, single-conductor cable for use in conduit installations.

B. Conductor: Class B stranded, annealed copper, sizes as shown on the Drawings and/or as required by NEC.

C. Voltage Rating: 600 volts.

D. Insulation: 75 /90 degrees C, THHN/THWN.

E. Approved Manufacturers: General Cable, Southwire or approved equal.

2.3 INSTRUMENTATION CABLE

A. Analog Cable: 600V, 18AWG copper twisted shielded pair with overall PVC jacket, Belden 9341, or approved equal.

B. Digital Cable: 600V, 18AWG copper twisted unshielded pair with overall PVC jacket, Belden 9486, or approved equal.

C. RTD Cable: 300V, 18AWG tinned copper twisted shielded pair with overall PVC jacket, Belden 83653, or approved equal.

D. Ethernet Cable: Category 6, 4 bonded pair 23AWG solid bare copper shielded with PVC inner and outer jacket, Belden 7953A, or approved equal

2.4 LOW VOLTAGE WIRING TERMINATIONS

A. All 480 V power terminations at motors and buswork shall be made with Burndy two-hole “Hylug” or approved equal compression type connectors.

B. All instrumentation wiring terminating at screw type terminals shall be made with Thomas & Betts “Sta-Kon” or approved equal insulated “fork-type” spring connectors.

2.5 ANTENNA CABLE

A. Coaxial Cable: low density foam coaxial cable, inner conductor – copper-clad aluminum wire, outer conductor - corrugated copper, 0.5 inch nominal size, black PE jacket, CommScope Heliax LDF4-50A cable and cable family connector types, or approved equal

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. The wire and cable quantity and sizes, as shown on the Contract Drawings shall not be considered absolute. This information, as indicated on the Contract Drawings or in this specification, is based on preliminary engineering data available to ENGINEER during preparation of the Contract Documents. CONTRACTOR shall completely review the Contract Drawings as specified in Section 16010, Electrical Conditions and based on the actual supplied equipment data and field conditions, and furnish all necessary Project wire and cable as required.

3.2 INSTALLATION – GENERAL GUIDELINES

A. The wire and cable installation shall include wire and cable handling, cutting, training, pulling, termination and testing.

B. All wiring and cable shall be enclosed in conduit, except temporary wiring installation, which shall comply with NEC requirements for temporary installations and as instructed by OWNER and/or by the local authority having jurisdiction.

C. All wiring shall be properly grounded, color-coded, phased and/or polarized throughout. The wiring color code shall be as follows:

1. AC Power and Lighting Wiring: Black phase markings in accordance with NEC.

2. AC Control Wiring: Red.

3. Ground: Green.

4. Instrumentation Analog and Digital Cable: White (+), black (-).

D. No conductor shall be installed until the raceway system that contains it is complete.

E. Install wire and cable in accordance with manufacturer's instructions. Employ manufacturer recommended tools and installation methods. Never exceed manufacturer's recommended cable bending radiuses and pull tensions. Pull all conductors into raceway at the same time. Use manufacturer recommended greaseless conductor pulling compound only.

F. All conductors shall be installed in continuous runs, from origin to equipment, without splices or joint unless specifically indicated on the Contract Drawings.

G. Cable splices, if any, and terminations shall carry full ampacity of conductors with no perceptible temperature rise.

H. All wire/cable terminations shall be made to terminal blocks, bus, or connectors in approved enclosures.

I. All conductors shall be installed and terminated without nicking the insulation.

J. Neatly train and lace wiring inside boxes, equipment, and panelboards.

K. All cables, cables conductors and wires shall be clearly identified with identification numbers, as indicated on the Drawings, at all pull boxes, equipment and devices enclosures, and at all terminating points. Identify each cable, cable conductor, or wire by a marker at each terminating point in accordance with Section 16075, Electrical Identification. All identification letters and numbers shall be typed.

L. Wire pulled prior to the equipment setting, or completion of conduit termination, shall be protected from the environment and shall be neatly coiled and protected from damage.

M. Terminations:

1. All cable terminations shall be completed only after the cable checks and tests have been performed and found acceptable by ENGINEER.

2. Conducting surfaces of the cable terminating ends shall be thoroughly cleaned before applying connectors.

3. No more than two wires shall be terminated at any terminal. Wire twisting around the terminal will not be allowed.

N. Checkouts and Tests:

1. Prove all interconnecting cable and wire continuity and freedom from grounds and short circuit.

2. Ensure the equipment proper polarity and phasing, and that all conductors have been terminated at the correct terminals.

3. All power, control, and instrumentation wiring shall be tested. Cable, which fails the test, shall be promptly replaced at CONTRACTOR'S expense.

4. All underground cables shall be tested twice prior to and after backfill of the trenches.

5. All test results shall be documented and submitted to ENGINEER for review and comments, and shall later become a part of the as-built documents.

6. The high voltage cable shall be given manufacturer's recommended high voltage test.

7. The low voltage cable tests shall be performed with a digital insulation and continuity tester (AVO INTERNATIONAL Megger BM80 or approved equal) as follows:

a. All 480V power and motor feeders shall be 1000 VDC megger tested. Record lowest readings. Reference insulation resistance numbers shall be obtained from the cable manufacturer.

b. Instrumentation cable shall be checked for continuity only (disconnect all associated surge protective devices during the test).

O. Phasing:

1. The entire electrical system shall be properly phased-out by CONTRACTOR, so that all three-phase transformers, motor control center, distribution panels, disconnects, power outlets, etc., are identical in phase relationship.

2. The phasing shall be of A-B-C sequence, left to right, top to bottom, front to back.

3.3 DEBRIS

A. During cable installation, at the end of each day, CONTRACTOR shall ensure that cable cuttings and other cable waste are deposited into a trash container to avoid any debris left in the work area, and in the equipment enclosures.

3.4 DAILY RUNNING RECORD

A. CONTRACTOR shall keep a daily running record of cables pulled and terminated, and it should be available for ENGINEER'S periodic inspection.

3.5 CLOSEOUT

A. On completion, CONTRACTOR shall demonstrate to the OWNER and ENGINEER that all Project wire and cable has been supplied and installed as specified.

END OF SECTION

SECTION 16130

BOXES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Equipment outlet boxes.

B. Wiring pull and junction boxes.

1.2 REFERENCES

A. Quality Requirements: References.

B. National Electrical Manufacturers Association (NEMA):

1. FB 1 - Fittings and Supports for Conduit and Cable Assemblies

2. OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports

3. OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports

4. 250 - Enclosures for Electrical Equipment (1,000 Volts Maximum)

C. National Fire Protection Association, Inc. (NFPA): 70 - National Electrical Code.

D. Underwriters Laboratories Inc. (UL).

1.3 REGULATORY REQUIREMENTS

A. Conform to NFPA 70.

B. Furnish products listed and classified by UL as suitable for purpose specified and shown.

1.4 PROGRESS SUBMITTALS

A. Facility Operation: Progress Submittals.

B. Product Data: Include for the specified boxes.

1.5 CLOSEOUT SUBMITTALS

A. Execution Requirements: Closeout Procedures, Project Record Documents.

B. Facility Operation: Closeout Submittals.

C. Record Documents: Record actual locations of the installed boxes on Drawings.

PART 2 PRODUCTS

2.1 EQUIPMENT OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, Galvanized steel:

1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2-inch male fixture studs where required.

B. Cast Boxes: NEMA FB 1 Type FD, aluminum or cast feralloy. Provide gasketed cover by box manufacturer. Provide threaded hubs.

C. Wall Plates for Finished Areas: Section 16140.

2.2 WIRING PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, Galvanized steel.

B. Surface-mounted Cast Metal Box: NEMA 250 Type 4, flat-flanged, surface-mounted junction box:

1. Material: Cast aluminum.

2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

C. Underground Wiring Handholes: As shown on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Execution Requirements: Examination.

3.2 INSTALLATION

A. Install in locations as shown on Drawings, and as required for wire pulling and equipment connections.

B. Set wall-mounted boxes at elevations to accommodate mounting heights at a minimum of 7 feet 0 inches above finished floor elevation.

C. Orient boxes to accommodate wiring devices oriented in accordance with Section 16140.

D. Maintain headroom and present neat mechanical appearance.

E. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

F. Install boxes to preserve fire resistance rating of wall partitions and other elements.

G. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

H. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.

I. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices.

J. Support boxes independently of conduit.

K. Use gang box where more than one device is mounted together. Do not use sectional box.

L. Use cast outlet box in exterior locations exposed to weather and wet locations.

M. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.

N. Coordinate installation of outlet box for equipment connected in accordance with Section 16150.

O. On completion of installation, clean interior of boxes to remove dust, debris, and other material.

3.3 FIELD QUALITY CONTROL

A. Quality Requirements: Inspecting and Testing Services.

B. On completion, demonstrate to ENGINEER that all boxes have been installed as specified.

END OF SECTION

SECTION 16140

WIRING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wall Switches.

B. Receptacles.

C. Device plates and decorative box covers.

1.2 RELATED SECTIONS

A. Section 01010 - Summary of Work

B. Division 16000 sections

1.3 REFERENCES

A. NFPA 70 – National Electrical Code (NEC)

B. ANSI/IEEE C2 – National Electrical Safety Code

C. OSHA CER 1910, Subpart S – Electrical General, Parts 1 and 2

D. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association

1.4 SUBMITTALS FOR REVIEW

A. Product Data – Provide manufacturer’s catalog information showing dimensions, colors, and configurations.

1.5 SUBMITTALS FOR INFORMATION

A. Submit manufacturer’s installation instructions.

1.6 QUALIFICATIONS

A. Manufacturer – Company specializing in manufacturing the Product specified in this section shall have minimum 3 years documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Provide Products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. All devices shall be as shown on the Contract Drawings and shall be UL listed and bear a label or imprinted mark stating so.

B. All devices shall be approved for application in the specified environment such as wet locations or hazardous area classification as needed.

PART 3 EXECUTION

3.1 INSTALLATION – GENERAL GUIDELINES

A. Unless noted otherwise on the Contract Drawings:

1. Mount convenience receptacles 18 inches above the finished floor.

2. Mount locking receptacles, utilized as equipment disconnects, at:

a. 24 inches above the finished floor for floor mounted equipment.

b. 72 inches (6 feet) above the finished floor for ceiling mounted equipment.

3. Mount devices vertically with the ground pole on the bottom.

3.2 CLOSEOUT

A. On completion, CONTRACTOR shall demonstrate to the OWNER and ENGINEER that all Project wiring devices have been provided and installed as specified.

END OF SECTION

SECTION 16210

ELECTRICAL UTILITY SERVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section describes CONTRACTOR's work to provide permanent electrical utility services for the Project.

1.2 SCOPE OF WORK

A. CONTRACTOR shall make arrangements with New York State Electric & Gas Corp (NYSE&G), the local power utility company, for modifications to existing electric services as specified herein.

1.3 REFERENCES

A. National Fire Protection Association, Inc. (NFPA): 70 - National Electrical Code. Conform to NFPA 70

B. NYSE&G Service Requirements

1.4 PROGRESS SUBMITTALS

A. Refer to the Special Conditions of these Contract Documents for submittal requirements.

1.5 CLOSEOUT SUBMITTALS

A. Refer to the Special Conditions of these Contract Documents for submittal requirements.

B. Record Documents: Electrical service as-built documentation.

PART 2 PRODUCTS

2.1 ELECTRICAL SERVICE REQUIREMENTS

A. Service Provider: NYSE&G: Tel: 1-800-572-1111

B. Service Location: Guenther Pump Station, 3478 Pleasant Ave, Hamburg, NY 14075

C. Existing Meter No.: 13 692 827/ Account No.: 1001-1114-260

D. Service Characteristics 480Y277volts, 60Hz, 3 phase, 4 wire, solidly grounded neutral. The system is sized as shown on the Contract Drawings

E. The electrical power feed from the service equipment to the new facility shall be underground from the padmount transformer

F. All materials shall be UL listed and as required by NYSE&G

G. Remove existing connections from Service equipment after new load(s) are functional

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. CONTRACTOR shall make arrangements with NYSE&G, the local power utility company, for the modifications for/at existing electric service. At a minimum, this task shall include the following activities:

1. Establish and maintain contacts with the local power utility operating in the Project area.

2. Obtain the utility service specifications and requirements. If required, file applications and obtain service permits.

3. Make all necessary design, space and location adjustments to the Project documentation to accommodate the service. Submit all service-related documentation to ENGINEER for review and approval.

4. Supply and install all service required equipment, wiring, grounding and metering, such as service laterals, transformer pads or poles, ground rods, metering enclosure, and the like.

5. Provide payment of utility company charges for the service revisions.

6. Coordinate service inspection and energization.

7. Contractor shall be responsible for installation of all Electrical equipment from the secondary terminals of the utility transformer to all the downstream distribution.

END OF SECTION

SECTION 16232

DIESEL EMERGENCY ENGINE GENERATOR

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section includes packaged diesel engine generator for emergency use in a Mission Critical application with the following features:

1. Diesel engine.
2. Alternator.
3. Unit-mounted radiator.
4. Diesel fuel-oil system.
5. Control and monitoring.
6. Generator overcurrent and fault protection.
7. Generator, exciter, and voltage regulator.
8. Interface/control of Load bank.
9. Vibration isolation devices.
10. Finishes.

B. Related Requirements:

1. Section 11500 - Fuel System
2. Section 15616 - Engine Exhaust System
3. Section 16233 – Portable Load Bank
4. Section 16400 – Bypass Automatic Transfer Switch

1.2 DEFINITIONS

A. AREP: Auxiliary winding regulation excitation principle. Voltage support for the AVR comes from independent auxiliary windings located in the main stator.

B. AVR: Automatic voltage regulator.

C. EPS: Emergency power supply.

D. EPSS: Emergency power supply system.

E. Operational Bandwidth: The total variation, from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

F. PMG: Permanent magnet generator. Voltage support for the AVR comes from an independent auxiliary permanent magnet generator, which is mounted on the shaft extension of the alternator.

1.3 ACTION SUBMITTALS

A. Product Data: For each component:

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Include thermal damage curve for generator.
3. Include time-current characteristic curves for generator protective device.
4. Include fuel consumption in gallons per hour at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.
5. Include airflow requirements for cooling and combustion air in cubic feet per minute at 0.8 power factor, and reference air-supply temperature. Provide Drawings indicating requirements and limitations for location of air intake and exhausts.
6. Include generator characteristics, including, but not limited to, kilowatt rating, efficiency, reactances, and short-circuit current capability.

B. Shop Drawings:

1. Include plans and elevations for engine generator and other components specified. Indicate access requirements affected by height of subbase fuel tank.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Identify fluid drain ports and clearance requirements for proper fluid drain.
4. Design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and supported equipment. Include base weights.
6. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for EPS equipment and functional relationship between all electrical components.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data:

B. Seismic Qualification Data: Certificates for engine generator, accessories, and components, from manufacturer.

1. Component Importance Factor: none required.
2. Dimensioned Outline Drawings of Equipment Unit: With engine and generator mounted on rails, identify center of gravity and total weight**,** and each piece of equipment not integral to the engine generator, and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Source Quality-Control Reports: Including, but not limited to, the following:

1. Certified summary of prototype-unit test report.
2. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
3. Certified Summary of Performance Tests: Certify compliance with specified requirement to meet performance criteria for sensitive loads.

4. Report of factory test on units provided prior to being shipped for this Project, showing evidence of compliance with specified requirements. The OWNER and/or ENGINEER shall be permitted to witness all factory performance tests.
5. Report of sound generation at octave bands in accordance with ISO 8528-10.
6. Report of exhaust emissions showing compliance with applicable regulations.
7. Certified Torsional Vibration Compatibility: Comply with NFPA 110.

D. Noise measurements with and without generator operating.

E. Field quality-control reports.

F. Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For engine generators to include in emergency, operation, and maintenance manuals.

1. In addition to items specified elsewhere.

a. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
b. Operating instructions mounted adjacent to generator location.
c. Training plan.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: One for every 10 of each type and rating, but no fewer than one of each.
2. Filters: One set each of lubricating oil, fuel, and combustion-air filters.
3. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.
4. Tools: Each tool listed by part number in operations and maintenance manual.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.8 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 2 years / 3,000 hours from date of generator commissioning.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide-

1. Caterpillar 3512C Series

B. Source Limitations:

1. Generator manufacturer must be the same as the engine manufacturer

2.2 PERFORMANCE REQUIREMENTS

A. ANSI-B11 Compliance: Comply with B11.19.

B. NFPA Compliance:

1. Comply with NFPA 37.
2. Comply with NFPA 70.
3. Comply with NFPA 110 requirements for Level 2 EPSS.

C. UL Compliance: Comply with UL 2200.

D. Engine Exhaust Emissions: Comply with EPA NSPS requirements for emergency generators and applicable state and local government requirements.

E. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at property line due to sound emitted by engine generator, including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation. Comply with ISO 8528-10 for sound measurements at 3.2 feet and 23.0 feet.

F. Environmental Conditions: Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: (50 deg C).
2. Relative Humidity: Zero to 100 percent.
3. Altitude: Sea level to 1000 ft above sea level.

2.3 ENGINE GENERATOR ASSEMBLY DESCRIPTION

A. Factory-assembled and tested, water-cooled engine, with brushless generator and accessories.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Mission Critical Rated:1500kW/ 1875 kVA.

D. Power Factor**:** 0.8

E. Frequency: 60 Hz

F. Voltage: 277/ 480-V ac.

G. Phase: Three-phase

H. Governor: Adjustable isochronous, with speed sensing.

I. Load factor 85%

J. Mounting Frame: Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.

1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and engine generator center of gravity.

K. Capacities and Characteristics:

1. Power Output Ratings: Nominal ratings as indicated at 0.8 power factor excluding power required for the continued and repeated operation of the unit and auxiliaries.
2. Nameplates: For each major system component to identify manufacturer's name, model, and serial number, of component.

L. Engine Generator Performance:

1. Steady-State Voltage Operational Bandwidth: 0.25 percent of rated output voltage, from no load to full load, and one-percent for non-PMG alternators.
2. Load Factor: 85-percent load factor according to ISO 8528-1.

    a. If below, supplier shall provide updated documents for performance modified to 85-percent load factor in regards to time before overhaul (TBO) and the respective maintenance schedule.

3. When facility loads are provided, a generator set sizing report from the manufacturer shall be provided, detailing each load, and the performance for each step.
4. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within 3.5-seconds.
5. Steady-State Frequency Operational Bandwidth: 0.25 percent of rated frequency, from no load to full load, and 0.5 percent for mechanical governed engines.
6. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
7. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
8. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
9. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 300 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically with PMG/AREP, without damage to generator system components.
10. Unit shall be capable of accepting 100 percent load step in one step per NFPA 110 requirements.

11. Start Time: Comply with NFPA 110 system requirements.

M. Engine Generator Performance for Sensitive Loads:

1. Oversizing generator compared with the rated power output of the engine is permissible to meet specified performance.

    a. Nameplate Data for Oversized Generator: Show ratings required by the Contract Documents rather than ratings that would normally be applied to generator size installed.

2. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 300 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to winding insulation or other generator system components.
3. Excitation System: Performance shall be unaffected by voltage distortion caused by nonlinear load.

    a. Provide permanent magnet or AREP excitation for power source to voltage regulator.

4. Start Time: Comply with NFPA 70 Articles. Comply with NFPA 11 system requirements.

2.4 DIESEL ENGINE

A. Fuel: ASTM D 975 diesel fuel oil, Grade 2-D S15.

B. Rated Engine Speed: 1800 rpm.

C. Lubrication System: Engine or skid mounted.

1. Filter and Strainer: Select according to engine manufacturer's requirements for particle removal.
2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

D. Jacket Coolant Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity and with UL 499.

E. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine generator mounting frame and integral engine-driven coolant pump.

1. Coolant: Glycol-based antifreeze and water mixture for freeze protection to minus 30 deg F, with anticorrosion additives as recommended by engine manufacturer.
2. Size of Radiator: Adequate to contain expansion of total system coolant, from cold start to 100 percent load condition.
3. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
4. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, UV-, and abrasion-resistant fabric.

    a. Rating: 50-psig maximum working pressure with coolant at 180 deg F, and noncollapsible under vacuum.
    b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

F. Muffler/Silencer: Designed to meet sound attenuation levels as specified herein.

1. Miratech disk super critical grade silencer (Mode DKSC) bottom Inlet / side Outlet, or equal.

    a. Carbon steel housing with black paint rated to 1200 °F. Shell packed with 2” minimum fiberglass insulation for sound absorption and temperature reduction.
    b. Silencer shall provide minimum of 30 dBA.

2. Flexible pipe assembly by B. Boulden Company, Inc or equal (between generator and silencer).

G. Air-Intake Filters: engine-mounted air cleaner with replaceable dry-filter elements

H. Starting System: Match engine ECU and genset control voltage requirements.

1. Components: Sized so they are not damaged during a full engine-cranking cycle, with ambient temperature at maximum specified in "Performance Requirements" Article.
2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
3. Cranking Cycle: As required by NFPA 110 for system level specified.
4. Battery: Lead acid, with capacity within ambient temperature range specified in "Performance Requirements" Article to provide NFPA 110 specified cranking cycle without recharging.
5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
6. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation.
7. Battery Charger: Current-limiting, automatic-equalizing, and float-charging type designed for lead-acid batteries. Unit shall comply with UL 1236 and include the following features:

    a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
    b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg F to 140 deg F to prevent overcharging at high temperatures and undercharging at low temperatures.
    c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
    d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
    e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
    f. Mounted on generator frame
    g. SENS NRG22-10-RCLS or equal

2.5 DIESEL FUEL-OIL SYSTEM

A. Comply with NFPA 30.

B. Piping: Fuel-oil piping shall be Schedule 40 black steel. Cast iron, aluminum, copper, and galvanized steel shall not be used in the fuel-oil system.

C. Main Fuel Pumps: Mounted on engine to provide primary fuel flow under starting and load conditions.

D. Fuel Filtering: Remove water and contaminants larger than 5 microns, or as recommended by the engine manufacturer. RACOR Diesel fuel filter/water separator or approved equal.

E. Relief-Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.

F. Storage and Day Tanks: (refer to Section 11500 Aboveground Fuel Storage Tank System)

1. The fuel pumps shall be integral to the engine.

2.6 CONTROL AND MONITORING

A. Automatic-Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of engine generator. When mode-selector switch is switched to the on position, engine generator starts. The off position of same switch initiates engine generator shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.

B. Controller software shall be nonproprietary and provided with equipment after start up and commissioning

C. Manual-Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts engine generator. The off position of same switch initiates engine generator shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.

D. Comply with UL 2200 for stationary engine generator assemblies and UL 508A for ancillary controls, such as Master Control Panel mounted off the generator set.

E. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the engine generator. Mounting method shall isolate the control panel from engine generator vibration. Panel shall be powered from the engine generator battery.

F. Configuration: Operating and safety indications, protective devices, basic system controls, engine gages, instrument transformers, generator-disconnect switch or circuit breaker, and other indicated components shall be grouped in a combination control and power panel. Control and monitoring section of panel shall be isolated from power sections by steel barriers. Panel shall be powered from the engine generator battery. Panel features shall include the following:

1. Wall-Mounting Cabinet Construction: Rigid, self-supporting steel unit complying with NEMA ICS 6 and NEMA 250.
2. Switchboard Construction: Freestanding unit. Power bus shall be copper. Bus, bus supports, control wiring, and temperature rise shall comply with UL 891.
3. Switchgear Construction: Freestanding unit.
4. Environmental Operating Conditions: 185 deg F.
5. Controller Compliance: Comply with UL, NFPA, CSA, and CE.
6. Software: Provide PC software at no charge, no activation fee, and without other fees.
7. Parallel Controllers: Controllers shall have redundant Ethernet ports with the capability to run in droop mode if communication fails for the unit isolated. System shall use a floating manager where the loss of any unit shall not disrupt the capability of the system.

G. Control and Monitoring Panel:

1. Digital controller with integrated LCD display, controls, and microprocessor, capable of local and remote control, monitoring, and programming, with battery backup.

a. PLC logic incorporating drag and drop ladder logic available for the owner/user. Logic shall be designed such that all parameters within the generator set controller can be used in addition to additional inputs and outputs.

2. Instruments: Located on the control and monitoring panel and viewable during operation.

a. Engine lubricating-oil pressure gage.
b. Engine-coolant temperature gage.
c. DC voltmeter (alternator battery charging).
d. Running-time meter.
e. AC voltmeter.
f. AC ammeter.
g. AC frequency meter.
h. Digital generator-voltage-adjusting feature to allow plus or minus 5 percent adjustment.

3. Controls and Protective Devices: Controls, shutdown devices, and common visual alarm and pre-alarm indication as required by NFPA 110 for Level 2 system, including the following:

a. Cranking control equipment.
b. Run-Off-Auto switch.
c. Control switch not in automatic position alarm.
d. Overcrank alarm.
e. Overcrank shutdown device.
f. Low water temperature alarm.
g. High engine temperature pre-alarm.
h. High engine temperature.
i. High engine temperature shutdown device.
j. Engine exhaust temperature.
k. High engine exhaust temperature alarm.
l. Overspeed alarm.
m. Overspeed shutdown device.
n. Low-fuel day tank.
    1) Low-fuel-level alarm shall be initiated when the level falls below that required for operation for the duration required for the indicated EPSS class.
o. Coolant low-level alarm.
p. Coolant low-level shutdown device.
q. Coolant high-temperature prealarm.
r. Coolant high-temperature alarm.
s. Coolant low-temperature alarm.
t. Coolant high-temperature shutdown device.
u. EPS load indicator.
v. Battery high-voltage alarm.
w. Low-cranking voltage alarm.
x. Battery-charger malfunction alarm.
y. Battery low-voltage alarm.
z. Lamp test.
aa. Contacts for local and remote common alarm.
bb. Low-starting air pressure alarm.
cc. Low-starting hydraulic pressure alarm.
dd. Remote manual-stop shutdown device.
ee. Generator overcurrent-protective-device not-closed alarm.
ff. Generator overspeed.
gg. Generator over and under voltage.
hh. Dead bus.
ii. Reverse power.
jj. Ground fault control.

H. Remote Telemetry Monitoring:

1. Provide Modbus TCP/IP communication over Ethernet cable interface for each alarm and status indication.

I. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator unless otherwise indicated.

J. Remote Emergency-Stop Switch: Provide two flush; wall-mounted unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

2.7 GENERATOR OVERCURRENT AND FAULT PROTECTION

A. Overcurrent protective devices for the entire EPSS shall be coordinated to optimize selective tripping when a short circuit occurs. Coordination of protective devices shall consider both utility and EPSS as the voltage source.

1. Overcurrent protective devices for the EPSS shall be accessible only to authorized personnel.

B. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 percent rated; complying with UL 489.

1. Tripping Characteristic: Adjustable LSIG designed specifically for generator protection.
2. Trip Rating: Matched to generator output rating.
3. Shunt Trip: Connected to trip breaker when engine generator is shut down by other protective devices.
4. Mounting: Adjacent to or integrated with control and monitoring panel.
5. Square D model SQ-D Powerpact-R 2500 A frame LSIG or equal

C. Generator Protector: Microprocessor-based unit shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of alternator will occur. When signaled by generator protector or other engine generator protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from load circuits. Protector performs the following functions:

1. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other engine generator malfunction alarms. Contacts shall be available for load shed functions.
2. Under single- or three-phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.
3. As overcurrent heating effect on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the engine generator.
4. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.

D. Ground-Fault Indication: Comply with NFPA 70, "Emergency System" signals for ground fault.

1. Indicate ground fault with other engine generator alarm indications.
2. Trip generator protective device on ground fault.

2.8 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

A. Comply with NEMA MG 1.

B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.

C. Electrical Insulation: Class H or Class F.

D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.

E. Range: Provide limited range of output voltage by adjusting the excitation level.

F. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.

G. Enclosure: Dripproof.

1. Ingress Protection Rating (IP): Follow IEC 60529.

H. Instrument Transformers: Mounted within generator enclosure.

I. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified and as required by NFPA 110.

1. Digital Adjustment on Control and Monitoring Panel: Provide plus or minus 5 percent adjustment of output-voltage operating band.

J. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.

K. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.

2.9 VIBRATION ISOLATION DEVICES

A. As recommended by the manufacturer to meet the following site requirements:

1. Maximum Vibration Transmission: 30 mm/s.
2. Based on ISO 8528-9 for vibration.
3. Spring isolators.

B. Vibration isolation devices shall not be used to accommodate misalignments or to make bends.

2.10 FINISHES

A. Indoor Enclosures and Components: Powder-coated finish over steel enclosure.

1. Components: Liquid paint.

2.11 SOURCE QUALITY CONTROL

A. Prototype Testing: Factory test engine generator using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.

1. Tests: Comply with NFPA 110, Level 1 Energy Converters and with IEEE 115.

B. Project-Specific Equipment Tests: Before shipment, factory test engine generator and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:

1. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
2. Test generator, exciter, and voltage regulator as a unit.
3. Full-load run.
4. Maximum power.
5. Voltage regulation.
6. Transient and steady-state governing.
7. Single-step load pickup.
8. Safety shutdown.
9. Report factory test results within 5 days of completion of test.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine generator performance.

B. Examine roughing-in for piping systems and electrical connections. Verify actual locations of connections before packaged engine generator installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

1. Notify Owner in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Owner's written permission.

3.3 INSTALLATION

A. Comply with packaged engine generator manufacturers' written installation and alignment instructions and with NFPA 110.

B. Equipment Mounting:

1. Install packaged engine generators on cast-in-place concrete equipment bases provided by GC.

2. Coordinate size and location of concrete bases for packaged engine generators. Provide anchor-bolts and layout to GC.

C. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.

D. Exhaust System: See specification 15616 Engine Exhaust System.

E. Drain Piping: Install condensate drain piping to muffler drain outlet with a shutoff valve, stainless-steel flexible connector, and Schedule 40 black steel pipe with threaded joints.

F. Fuel Piping:

1. Diesel storage tanks, tank accessories, piping, valves, and specialties for fuel systems.
2. Copper and galvanized steel shall not be used in the fuel-oil piping system.

G. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.4 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping and specialties.

B. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow space for service and maintenance.

C. Connect engine exhaust pipe to engine with flexible connector.

D. Connect fuel piping to engine with a gate valve, union and flexible connector.

E. Ground equipment according to Section 16060 - Grounding and Bonding

F. Provide a minimum of one 90-degree bend in flexible conduit routed to the engine generator from a stationary element.

G. Balance single-phase loads to obtain a maximum of 10 percent unbalance between any two phases.

3.5 IDENTIFICATION

A. Identify system components according to Section 15190 – Mechanical Identification and Section 16075 – Electrical Identification.

B. Install a sign indicating the generator neutral is bonded to the main service neutral at the main service location.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: CONTRACTOR shall engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections with the assistance of a factory-authorized service representative.

D. Tests and Inspections:

1. Perform tests recommended by manufacturer and in "Visual and Mechanical Inspection" and "Electrical and Mechanical Tests" subparagraphs below, as specified in the NETA ATS. Certify compliance with test parameters.

    a. Visual and Mechanical Inspection:

        1) Compare equipment nameplate data with Drawings and the Specifications.
        2) Inspect physical and mechanical condition.
        3) Inspect anchorage, alignment, and grounding.
        4) Verify that the unit is clean.

    b. Electrical and Mechanical Tests:

        1) Perform insulation-resistance tests according to IEEE 43.

            a) Machines Larger Than 200 hp: Test duration shall be 10 minutes. Calculate polarization index.
            b) Machines 200 hp or Less: Test duration shall be one minute. Calculate the dielectric-absorption ratio.
            c) Test is allowed to be done by the manufacturer during assembly in the case where field test requires disassembly of factory wiring and can void warranty.

        2) Test protective relay devices.
        3) Verify phase rotation, phasing, and synchronized operation as required by the application.
        4) Functionally test engine shutdown for low oil pressure, overtemperature, overspeed, and other protection features as applicable.
        5) Perform vibration test for each main bearing cap.
        6) Conduct performance test according to NFPA 110.
        7) Verify correct functioning of the governor and regulator.

2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here, including, but not limited to, single-step full-load pickup test.

3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.

    a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
    b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
    c. Verify acceptance of charge for each element of the battery after discharge.
    d. Verify that measurements are within manufacturer's specifications.

4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.

5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.

6. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40-inch wg. Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.

7. Exhaust Emissions Test: Comply with applicable government test criteria.

8. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.

9. Harmonic-Content Tests: Measure harmonic content of output voltage at 25 percent and 100 percent of rated linear load. Verify that harmonic content is within specified limits.

10. Noise-Level Tests: Measure A-weighted level of noise emanating from engine generator installation, including engine exhaust and cooling-air intake and discharge, at four locations (25 feet from the generator building, and compare measured levels with required values.

E. Coordinate tests with tests for transfer switches, and run them concurrently.

F. Test instruments shall have been calibrated within the past 12 months, traceable to NIST Calibration Services, and adequate for making positive observation of test results. Make calibration records available for examination on request.

G. Leak Test: After installation, charge exhaust, coolant, and fuel systems and test for leaks. Repair leaks and retest until no leaks exist.

H. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation for generator and associated equipment.

I. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

J. Remove and replace malfunctioning units and retest as specified above.

K. Retest: Correct deficiencies identified by tests and observations, and retest until specified requirements are met.

L. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component, indicating satisfactory completion of tests.

M. Infrared Scanning: After Substantial Completion, but not more than 60 days after final acceptance, perform an infrared scan of each power wiring termination and each bus connection while running with maximum load. Remove all access panels, so terminations and connections are accessible to portable scanner.

1. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
2. Record of Infrared Scanning: Prepare a certified report that identifies terminations and connections checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken and observations after remedial action.

3.7 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's authorized service representative. Include quarterly preventive maintenance and exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Parts shall be manufacturer's authorized replacement parts and supplies.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

3.9 LONG-TERM STORAGE

A. In the event the packaged engine generator sits for more than one month without being operated, the following provisions shall be followed:

1. Comply with the manufacturer's storage requirements.
2. Provide fuel conditioning and stabilizing for onsite fuel as required.
3. Engage a factory-authorized service technician to put packaged engine generator back into service before running.

END OF SECTION

SECTION 16233

PORTABLE LOAD BANK SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section covers minimum requirements for the project's new portable 2000kW 480 V 60Hz 3 phase 4 wire Resistive Load bank system that will be used to regularly test the new 1500 kW 480V 60Hz standby generator at the Guenther Pump Station and other 480 V standby generators at other ECWA sites to ensure they are always in proper operating condition.

1.2 RELATED SECTIONS

A. The following sections relate to this section Work:

1. Section 01010 – Summary of Work
2. Division 16 – Electrical

1.3 REFERENCES

A. CONTRACTOR'S Work shall comply with the latest requirements of all applicable codes, standards, guides, practices and local regulations pertaining to the job at the time of bidding, and it shall carry approval labels where required. As a minimum, the latest versions of the following shall apply:

1. ANSI/NFPA 70 – National Electrical Code
2. NFPA 70E – Standard for Electrical Safety in the Workplace
3. ANSI/IEEE C2 – National Electrical Safety Code
4. OSHA CER 1910, Subpart S – Electrical General, Parts 1 and 2
5. IEEE 587, Category B (ANSI C62.41)
6. ASTM A463
7. ANSI 61

1.4 PERFORMANCE AFFIDAVITS

A. Provide performance affidavits for all equipment supplied under this Section.

B. Submit performance affidavits in conformance with Section 01300.

C. By these affidavits, each manufacturer must certify to the CONTRACTOR and the OWNER, jointly, that he has examined the Contract Documents and that the equipment, apparatus, process or system he offers to furnish will meet in every way the performance requirements set forth in the Contract Documents. Equipment design, manufacturing and assembly specifications are an integral part of the performance requirements.

D. Shop drawings will not be reviewed prior to receipt by the ENGINEER of an acceptable performance affidavit.

E. The performance affidavit must be signed by an officer (vice president or higher) of the basic corporation, partnership or company manufacturing the equipment, and witnessed by a notary public.

F. The performance affidavits shall be in the following format:

Addressed to: (Contractor) and (Owner)
Reference: Contract No.
(Project)
Text: "(manufacturer's name) has examined the Contract Documents and verified that the (product) meets in every way the performance requirements and design specifications set forth in Section(s) of the Contract Documents."
Signature: Corporate officers shall be vice president or higher (unless statement authorizing signature is attached).
Notary: Signature(s) must be notarized.

1.5 SUBMITTALS FOR REVIEW & APPROVAL

A. CONTRACTOR shall submit, for approval, the LOAD BANK dimensional data, front elevation, floor plan and top view, conduit entry/exit locations, and allowable cable terminal size; nameplate list; components list; single-line; wiring diagram; LOAD BANK electrical rating data including KW, KVA, load rating, fault rating, LOAD BANK ambient temperature range and LOAD BANK name plate.

1.6 SUBMITTALS FOR CLOSEOUT

A. On completion, CONTRACTOR shall submit final as-built documents, certified production test report, and installation and maintenance manuals.

1.7 EQUIPMENT WARRANTY

A. The CONTRACTOR shall warrant, in writing, that all equipment provided as part of the Load bank System shall be free from defects in material and workmanship for a period of 24 months from the date of startup, unless noted otherwise within the specifications.

B. The CONTRACTOR shall warrant, in writing, that all workmanship provided as part of the LOAD BANK System shall be warrantied for a period of 24 months from the date of startup.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. ASCO Model 5820 2000 kW 480V Load bank Trailer Mounted.

B. Or approved equal.

2.2 GENERAL DESCRIPTION

A. Equipment - Generator Load Bank

1. Provide a fan-cooled resistive load bank for portable and outdoor use. The load bank is to be used for periodic, scheduled and supervised maintenance exercise and testing of the emergency power source. The load bank shall be designed to operate locally with individual knob control step resolution.

2. Except as otherwise indicated, the load bank and ancillary components shall be of types, sizes, characteristics, and ratings indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information, and as required for complete installation.

3. The load bank shall be factory mounted and balanced on a DOT and ICC legal bumper pull trailer. Electric brakes, stabilizer jacks, 3" adjustable lunette eye hitch, spare tire, and industrial epoxy painted finish to be provided. The equipment shall be designed to accommodate feeder and control cabling.

4. The Load bank shall be designed for continuous duty operation in the outdoor environment.

5. Design ambient temperature range for the Load bank shall be -20°F to 120°F.

6. Construction of the Load bank shall be in NEMA Type 3R enclosures, designed for outdoor use. Paint interior and exterior using ANSI 61 (gray) thermosetting polyester powder paint.

7. The Load bank shall have adequate ventilation, which shall be provided to ensure that all components are operating well within temperature ratings. The cabinet blowers shall be redundant so that a single blower failure will not cause temperatures to increase beyond acceptable limits.

8. Four (4) electric cable reels Hannay reels or approved equal with cable reel security covers.

B. Ratings

1. The portable load bank shall be continuously rated 2000 KW resistive, duel voltage 480/240 Volts, 3 Phase, 4 wire.

2. The unit shall be self-contained, housed in a durable weatherproof housing, mounted on a 4 wheel trailer with a Tongue Jack with a capacity of 10,000 lbs or more.

C. Other Ratings

1. Overload capacity shall be 105% for 1 hour.

2. The power factor of the load bank should remain near unity (1.0).

3. The load bank shall be designed for continuous duty cycle operation.

2.3 DESIGN

A. The unit shall have the following features:

1. Load increments at 240V or 480V of 5, 10, 10, 25 and 50 KW, connectable in any combination.

2. Digital Power Meter (Volts, Amperes, Frequency & KW)

3. Load increments contactor controlled and fused.

4. Cooling Fans and controls fed by independent 120V fused circuit with 15 foot cord and NEMA 20P cap.

5. Connectorized Power Connections with 20 circuit feet of extra flexible copper XLP cable (4/0AWG minimum size) with connector matching connector.

6. Over Temperature, Fan Failure protection.

7. NEMA 3R Enclosure.

8. Load bank shall have a Two Years Un-conditional Warranty against all manufacturing defects.

9. The blower motor(s) shall be factory wired to the main load bus. Provisions for an external power source shall also be provided. An integral 120V, 1 Phase, 60 Hz control power transformer shall be provided for control circuit operation. The control power transformer shall receive its power from the blower motor circuit.

10. Cooling system of 20,000 CFM cooling (per individual vertical frame) shall be provided by integral TEFC or TEAO motor which shall be directly coupled to the cooling fan blade. The fan motor shall be fully protected with fuses, motor starter contractor, and overload relay.

11. The standard load control for the load bank shall be a local manual panel. Controls shall include: Power On/Off switch, Blower Start/Stop push buttons, Master Load On/Off switch, and Individual Load Step switches. Visual indicators shall include: Power On, Blower On, and Blower/Air Failure.

12. Monitoring System shall be provided for display of Volts, Amps, Frequency, and kW. It shall also include Data Logging Software.

13. The load bank shall be constructed using heavy gauge aluminized steel per ASTM A463. It shall be designed for continuous outdoor weatherproof operation. Forklift channels shall be provided in the base for lifting. All exterior fasteners shall be stainless steel. The main input bus, load step relays, fuses, and blower/control relays shall be located in the main enclosure. A vinyl storage cover shall also be provided.

14. Quick connect cable receptacles shall be securely mounted to the cool air intake side of the load bank.

15. The load bank shall be high quality baked polyester powder coated finish with a film thickness of 2.8 +/- 0.4 mils per coat. The color shall be gray (ANSI 61).

B. The load bank system shall be resistive type load consisting of a trailer mounted Load bank cabinet.

C. The load bank cabinet shall accommodate main circuit fuses, ground lugs, fused motor starter, over temperature sensor intake, positive air flow sensor, and an over voltage protection circuit.

D. Resistive Load Elements

1. Load elements shall be helically wound chromium alloy rated to operate at approximately ½ of maximum continuous rating of wire.

2. The change in resistance due to temperature shall be minimized by maintaining conservative watt densities

E. Protective Devices

1. A positive air flow sensor shall be provided to detect air loss in the unit to prevent load from being applied if cooling air is not present and temperature in the cabinet remains below 104°F.

2. An over temperature sensor shall be provided to sense the load bank temperature to prevent damage and/or a decrease in resistance of the unit due to high temperatures.

3. An over voltage protection circuit shall be installed in unit to protect all electrical equipment involved in the load bank.

4. The exterior of the load bank shall have appropriate warning/caution statements on access panels.

2.4 ENCLOSURE, WIRING AND GROUNDING

A. Enclosure – Load bank cubicle shall be NEMA 3R enclosure.

B. Wiring – All wiring shall be flame-retardant, 480V, SIS insulated, stranded copper wire. Wiring shall run continuous length from termination to termination. All wiring shall be marked at both termination ends with permanent heat shrink type markers per applicable wiring drawings.

C. Grounding – Provide grounding lugs and the enclosure bonding.

2.5 NAMEPLATE

Provide Load bank cubicle information/data nameplate. The nameplate shall be constructed from corrosion-resistant material, permanently attached to the cubicle enclosure and shall contain information as required by applicable codes.

2.6 PAINTING

Load bank enclosure shall be given manufacturer's standard painting system. Minimum dry film thickness shall be 6 mils. Color of the enclosure interior and exterior finish coat shall be gray (ANSI61).

2.7 TESTS

A. Factory Tests:

Prior to shipment perform equipment testing. Certified copies of all test data shall be supplied to Buyer. If requested, the tests shall be witnessed by Buyer. The following factory tests shall be completed:

1. All control functions.

2. All alarm and trip functions.

1. All metering functions.

2. Full load test of system for 8 hours.

B. On-Site Tests:

The following on-site acceptance tests shall be completed by equipment manufacturer. Certified copies of all test data shall be supplied to Buyer.

1. Visual inspection.

2. Control functions.

3. Alarm and trip functions.

4. Metering functions.

5. Equipment initial start-up.

2.8 DOCUMENTATION:

Load bank documentation shall consist of quotation, approval and certified as-built submittals as follows:

A. Quotation Submittals

1. "Equipment Specification Sheet –LOAD BANK" with information completed and/or confirmed.

2. Preliminary Arrangement drawing showing the LOAD BANK dimensions and weights.

3. LOAD BANK specification.

4. Spare parts list with prices and delivery.

5. Shipment point of origin and method of packing.

B. Approval Submittals

1. Arrangement drawing showing the LOAD BANK dimensions, elevations and weights.

2. Elementary diagrams showing each wire marking and termination point.

3. Connection diagrams showing physical location of devices and wiring connection points.

4. LOAD BANK specification.

5. Spare parts list with current prices and deliveries.

C. Certified Documentation

1. Certified documentation specified in Section B.

2. Factory test results.

3. On-site test results.

4. Installation and maintenance manuals.

PART 3 EXECUTION

3.1 DESIGN AND FABRICATION

A. The LOAD BANK shall be designed and fabricated in accordance with this section reference documents, and in compliance with the manufacture's QA program.

3.2 FACTORY TESTS

A. The load bank tests shall be performed in accordance with all applicable reference standards for load bank systems.

B. Upon completion of the tests, prior to shipment, certified copies of all factory test reports shall be provided to ENGINEER for review and approval.

3.3 SHIPMENT

A. Shipment of load bank system

1. Load bank shall be delivered complete in one shipment and pre mounted on the trailer before delivery.

3. All shipment items shall be suitably braced and packed for shipping to prevent breakage or distortion while in transit.

4. One set of as-built documentation and installation manual shall be packed and shipped with the load bank.

B. Delivery: On delivery, inspect the equipment for signs of damage and loose connections.

C. Rigging and Handling:

1. Provide manufacture-recommended rigging equipment and qualified operators.

2. Handle the load bank components carefully to avoid damage to the internal components and finish.

3. Lift only at points provided for the purpose.

D. Storage:

1. Store each of the load bank components in its final location or in safe and dry designated storage area.

2. Maintain factory wrapping or provide additional heavy canvas or heavy plastic over to protect equipment from construction environment, dirt, water, and other construction debris.

3. Barricade load bank location to prevent possible damage by construction activities and/or traffic.

3.4 PREPARATION

A. This Work shall be in close communication with OWNER and ENGINEER and it shall require CONTRACTOR'S strict adherence to OWNER'S rules and regulations. CONTRACTOR shall not impede nor in any way interfere with the OWNER'S facility operation.

B. CONTRACTOR shall carefully examine the existing site conditions, disconnect all effected existing power, control and instrumentation wiring and/or associated power sources, and provide all necessary and required temporary electrical connections as indicated on Contract Drawings and specifications.

3.5 INSTALLATION

A. After load bank mounted on the trailer is delivered at site and the installation is completed, provide on-site load bank installation inspection, testing and energization by the LOAD BANK manufacturer representative. Confirm that all bolted connections are in accordance with the manufacturer's recommended torque requirements.

B. The load bank inspection, testing and energization shall be in close communication with OWNER, and it shall be witnessed by the ENGINEER.

C. The on-site load bank inspection and test reports shall be provided as a part of Record Documents.

3.6 FIELD QUALITY CONTROL

A. On completion, demonstrate to ENGINEER that the load bank supply and installation, and all as-built documentation has been provided as specified.

3.7 SERVICE

A. Labor, parts and service shall be available within 75 miles radius of the facility and shall have a service response time of 4 hours or less.

END OF SECTION

SECTION 16235

DUAL PURPOSE DOCKING STATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section defines minimum requirements for the docking station equipment work.

1.2 RELATED SECTIONS

A. This section work shall be as specified in the following related sections:

1. Section 01010 - Summary of Work

2. Division 16 - Electrical

1.3 SUBMITTALS

A. See appropriate sections of Division 1 for submittal procedures.

B. Shop Drawings: Indicate at a minimum outline and dimensions, nameplate, schematic one-line diagrams, product data sheets, and front and plan views.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual locations and arrangements.

E. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store in clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

1.6 GUARANTEE/WARRANTY

A. The equipment installed under this contract shall be left in proper working order.

B. New materials and equipment shall be guaranteed against defects in composition, design or workmanship. Two-year Guarantee certificates shall be furnished.

PART 2 PRODUCTS

2.1 GENERATOR DOCKING STATION

A. Manufacturers:

1. TRYSTAR One-Line Code: DBDS-5.
2. Or approved equal.

2.2 GENERAL REQUIREMENTS

A. Docking station shall include 16 Series Camlok Panel Mounts for use as connection to Portable Generator and Temporary Load Bank.

B. Entire package must be listed to ETL or UL 1008 Standards. UL listing of individual components is not acceptable.

C. Enclosures:

1. NEMA 3R rain-tight, 304 GA aluminum enclosure
    a. Pad-lockable front door shall include a hinged access plate at the bottom for entry of cables from portable generator or portable load bank. NEMA 3R integrity shall be maintained with access plate open for cable entry.
    b. Front and side through a front access panel shall be accessible for maintenance.
    c. Top, side, and bottom through a front access panel shall be accessible for permanent cabling.
2. Finishes:
    a. Paint after fabrication. Powder coated Hammertone Gray.

D. Phase, Neutral, and Ground Buses:
1. Material: Silver-plated Copper
2. Equipment Ground Bus: bonded to box.
3. Isolated Ground Bus: insulated from box.
4. Ground Bus: 50% of phase size.
5. Neutral Bus: Neutral bus rated 100 percent of phase bus.
6. Round edges on bus.

E. Temporary generator connectors shall be Camlok style mounted on gland plate.

1. Camlok shall be color coded according to system voltage
    a. A phase – Black or Brown
    b. B phase – Red or Orange
    c. C phase – Blue or Yellow
    d. N Neutral – White
    e. G Ground – Green

F. Temporary load bank connectors shall be Camlok style mounted on gland plate.

1. Camlok shall be color coded according to system voltage
    a. A phase – Black or Brown
    b. B phase – Red or Orange
    c. C phase – Blue or Yellow
    d. G Ground – Green

G. Temporary connectors shall include protective flip lids to prevent accidental contact.

H. Permanent connectors shall be broad range set-screw type, located behind an aluminum barrier.

I. Short Circuit & Withstand Rating
1. Shall be minimum 65KAIC unless otherwise indicated on drawings.

J. Voltage & Amperage
1. 2500A – 480V 4W + G

K. Phase Rotation Monitor Device
1. Phase monitoring relay to be Siemens 3U4512-1AR20 or approved equal.

L. Breaker Disconnects as Indicated on Project Drawings and Manufacturer Submittal Drawings:
1. Must be UL 489 Listed Breaker
2. Breakers shall be removable for service and maintenance

M. Additional accessories shall be included in submittal drawings as follows:
1. A: Two Wire Auto Start
2. B: Battery Charger Receptacle 20A DUPLEX 125V
3. D: Block Heater Receptacle 30A L5-30 125V
4. K2: Kirk Key Door Interlock

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive Generator Docking Station for compliance with installation tolerances and other conditions affecting performance of the Work.

3.2 INSTALLATION

A. Surface, Flush or Base Mounted: Determined by Application

1. Install anchor bolts to elevations required for proper attachment to Generator Docking Station.

B. The maximum allowable footprint shall be 48 inches wide and 61 inches deep.

3.3 FIELD QUALITY CONTROL

A. Third-Party Tests and Inspections to include the following:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

B. Prepare test and inspection reports, including a certified report that identifies Generator Docking Station and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION

SECTION 16400

AUTOMATIC TRANSFER SWITCH

PART 1 GENERAL

1.1. SUMMARY

A. Provide transfer switch for a Mission Critical application, individually floor mounted as shown to transfer from one service source to the generator. Units shall receive power from the source to which the switch will transfer.

1.2. SECTION INCLUDES

A. Automatic transfer switch with bypass.

1.3. RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

B. Section 16010 - Electrical Conditions

C. Section 16232 - Diesel Emergency Engine Generator

1.4. REFERENCES

A. The automatic transfer switches and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of UL and NEMA for Mission Critical applications as follows:

1. UL 1008 – Transfer Switches
2. UL 991 - Tests for Safety-Related Controls Employing Solid-State Devices
3. NFPA 70 – National Electrical Code
4. NFPA 110 – Emergency and Standby Power Systems
5. NEMA ICS 10 – AC Transfer Switch Equipment
6. IEEE 446 – Recommended Practice for Emergency and Standby Power Systems

1.5. SUBMITTALS

A. Submit under provisions of these specifications.

B. Shop drawings shall be submitted for all materials furnished under this section.

C. The shop drawing shall include, as a minimum, the following equipment specification information. The information shall be highlighted and prove compliance with these specifications.

1. Electrical Ratings - voltage, switch ampere rating, and short circuit ratings.

2. Protective devices and ratings.

3. Elevation drawings, estimated weights, and mounting methods.

4. AC and DC schematic drawings.

5. Performance functions.

6. Sequence of operation.

D. Manufacturer's Instruction - The Contractor shall furnish three copies of a composite instruction book covering this equipment. Each instruction book shall not necessarily be limited to, but shall include as a minimum, the following:

1. Instructions covering overall equipment.

2. Instructions covering all major and serviceable components.

3. Instructions covering all accessories.

4. Recommended spare parts with current prices, applicable to foregoing paragraphs 1, 2, and 3.

5. Complete renewal parts information.

6. Indicate application conditions and limitations of use stipulated by product testing agency specified under Article 1.08. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

1.6. OPERATION AND MAINTENANCE DATA

A. Contractor shall submit operation and maintenance data in both hard copy and electronic formats. Submit under provisions of Section 01781.

B. Operation Data - Include instructions for operating equipment. Include instructions for operating equipment under emergency conditions when the "normal" electric service is disconnected.

C. Maintenance Data - Include routine preventative maintenance and lubrication schedule. List special tools, maintenance materials, and replacement parts.

1.7. QUALIFICATIONS

A. Manufacturer - Company specializing in manufacturing the products specified in this section with minimum 10 years' documented experience, and with service facilities within 100 miles of project.

B. Supplier - Authorized distributor of specified manufacturer with minimum 10 years' documented experience.

1.8. REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Furnish products listed and classified by UL or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.

C. American National Standards Institute (ANSI).

D. American Society for Testing and Materials (ASTM).

E. National Electrical Manufacturer's Association (NEMA), latest version.

1. ICS 1 - General Standards for Industrial Control and Systems.

2. ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies.

3. ICS 4 - Terminal Blocks for Industrial Control Equipment and Systems.

4. ICS 6 - Enclosures for Industrial Controls and Systems.

1.9. DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01600 “Materials and Equipment.”

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to internal components, enclosure and finish.

1.10. FIELD MEASUREMENTS

A. Transfer switches are wall or pad mounted as shown. Verify switch will fit into the location indicated on the Contract Drawings.

1.11. MAINTENANCE SERVICE

A. Furnish service and maintenance of transfer switch for one year from Date of Substantial Completion.

1.12. MAINTENANCE MATERIALS

A. Provide maintenance materials under provisions of Section 01781.

1.13. WARRANTY

A. In addition to the Contractor's warranty period, the transfer switch shall be warranted by the manufacturer for 2 years.

PART 2 PRODUCTS

2.1. MANUFACTURERS

A. Eaton Bypass Isolation Magnum (Basis of Design).

B. Approved Equal.

2.2. CONSTRUCTION

A. Switches shall be free standing construction utilizing draw-out mounted power case switches or circuit breakers, Eaton type MAGNUM DS or approved equal.

B. Ratings shall be per the drawing. All breakers shall be UL listed for application in their intended enclosures for 100% of their continuous ampere rating. Breakers shall be electrically operated.

C. All breakers shall be provided with a true, two-step stored energy mechanism providing a maximum of three-cycle closing. All the energy required for closing the breakers shall be completely stored and held in readiness pending a release to close action. The power case switch or breaker shall have high-endurance characteristics being capable of no-load and full-load interruptions at rated current equal to or exceeding the UL endurance ratings for power circuit breakers without maintenance.

D. Transfer switch shall be open transition and provided with an in-phase monitor feature, which will permit a transfer or re-transfer between two live sources that have a phase angle difference of +/- 8 degrees or less. In the event that the switch cannot transfer in-phase, the switch will default to a time delay in neutral transfer adjustable 0-120 seconds.

2.3 GENERAL

A. The switching panel shall consist of completely enclosed contact assemblies and a separate control or transformer panel. Control power for all transfer operations shall be derived from the line side of the source to which the load is being transferred.

B. Each transfer switch shall be positively interlocked both mechanically and electrically to prevent simultaneous closing of both sources under either automatic or manual operation. Main contacts shall be mechanically locked in position in both normal and emergency positions. A neutral position shall not be possible under normal electrical operation unless a delayed transition accessory is required for switching highly inductive loads.

C. Transfer switches shall be capable of being operated manually under full rated load conditions. Manual operation shall be accomplished by a permanently attached manual operator, or by integrally mounted pushbuttons. Removable manual operating handles, and handles that may move in the event of an electrical operation during the manual operation, are not acceptable. Manual operators requiring source or load disconnection prior to manual operation are not acceptable.

D. On transfer switches requiring a fourth pole for switching the neutral, the neutral shall be fully rated with equal withstand, closing and interrupting ratings to the power poles. Switched neutral poles which are add-on or overlap, or that are not capable of breaking full rated load current are not acceptable.

E. The transfer switch shall have a multi-tap voltage selection plug for ease of voltage adjustment in the field.

F. ATS shall have a total of four draw-out Magnum or approved equal contactors (2 for ATS and 2 for Bypass).

G. ATS shall be of 4000 A capacity, 480/277V, 4 pole with an AIC rating of 100kA or more which exceeds the available fault current.

H. Where shown on the drawings, transfer switches applied as service entrance equipment, shall be provided with over-current trip units and a service entrance label. A key-operated selector switch shall be provided to disconnect the power supplies. Indicators shall be provided to show the availability of each source as well as breakers in a disconnected position. Provide a neutral disconnect link for three-pole solid neutral switches, and a neutral-to-ground main bonding jumper for all switches to meet UL service entrance requirements. Ground fault protection shall be provided for all switches rated 1000 amperes or more applied on 480Y/277 Vac systems in accordance with NEC Article 230-95.

I. Where indicated on the drawings, the transfer switches shall be provided with a draw-out mechanism to allow easy access for preventive maintenance, testing or inspection. The draw-out mechanism shall provide visual indicators as to the position of the switch/breaker during the draw-out operation.

J. When the transfer switches shall be provided with a draw-out mechanism, shuttered cassettes should be provided for safety purposes

K. When the transfer switches shall be provided with a draw-out mechanism and Nema 1 enclosure, a roof mounted breaker lifting device shall be included.

2.4 BYPASS ISOLATION

A. A manual bypass isolation switch shall provide isolation of the source and load power conductors to the ATS. The bypass transfer switch shall have current, voltage, and withstand ratings equal to the interconnected automatic transfer switch. Transfer to bypass shall be a manually initiated no-load break type transfer.

B. Positive mechanical interlocks shall be provided for bypass isolation switches to prevent cross connection of services.

C. When provided, the automatic transfer switch and the bypass isolation switch sections shall be factory interconnected with copper bus.

D. The bypass isolation transfer switches shall be provided with a draw-out mechanism to allow access for preventive maintenance, testing or inspection. The draw-out mechanism shall provide visual indicators as to the position of the switch/breaker during the draw-out operation.

2.5 MICROPROCESSOR LOGIC

A. The transfer switch shall be equal to an Eaton ATC-900 type microprocessor-based controller. The controller shall be hardened against potential problems from transients and surges. Operation of the transfer switch and monitoring of both sources shall be managed by the controller.

B. The automatic transfer switch controllers shall meet or exceed the following standards in addition to the basic switch standards:

1. IEC 61000-4-2 - EMC Testing and Measurement Techniques - Electrostatic Discharge Immunity Test

2. IEC 61000-4-3 - EMC Testing and Measurement Techniques - Radio-frequency, Electromagnetic Field Immunity Test

3. IEC 61000-4-4 - EMC Testing and Measurement Techniques - Electrical Fast Transient/Burst Immunity Test

4. IEC 61000-4-5 - EMC Testing and Measurement Techniques - Surge Immunity Test

5. IEC 61000-4-6 - EMC Testing and Measurement Techniques - Immunity to Conducted Disturbances, Induced by Radio-frequency Fields

6. IEC 61000-4-11 - EMC Testing and Measurement Techniques - Voltage Dips, Short Interrupts and Voltage Variations Immunity Tests

7. CISPR11, Class B - Industrial, Scientific and Medical Radio-frequency Equipment - Electromagnetic Disturbance Characteristics - Limits and Methods of Measurement

8. FCC Part 15, Subpart B, Class B

2.6 ENCLOSURE

A. Each transfer switch shall be provided in a NEMA 1 enclosure suitable for use in environments indicated in the drawings.

B. NEMA enclosures shall be painted with the manufacturer's standard light gray ANSI 61 paint.

2.7 CONTROLLER DISPLAY AND KEYPAD

A. The microprocessor-based controller display shall be UV resistant and include a 4.3 inch Color TFT (480x272), backlit display. The controller shall be capable of displaying transfer switch status, parameters, and diagnostic data. All set point parameters shall be password protected and programmable using the controller keypad, USB port, or remotely using serial port access. Limited abbreviations or codes shall be used for transfer switch functions.

B. The microprocessor-based controller shall include a mimic bus display consisting of six (6) individual LED's (3mm) for indicating the following:

1. Availability status of source 1

2. Availability status of source 2

3. Connection status of source 1

4. Connection status of source 2

5. Source 1 Preferred

6. Source 2 Preferred

2.8 VOLTAGE AND FREQUENCY SENSING

A. The controller shall have a voltage range of 0-790 volts (50/60 Hz) and an accuracy of +/- 1% of the reading and a frequency range of 40-70 Hz and an accuracy of +/- .3 Hz.

B. Voltage and frequency dropout and pickup parameters are set as a percentage of the nominal voltage as indicated in the table below.

Setpoint	Sources	Dropout	Pickup
Undervoltage	Source1 and 2	70 – 97%	(DO + 2%) - 99%
Overvoltage	Source 1 and 2	105 – 110%	103% - (DO – 2%)
Underfrequency	Source 1 and 2	90 – 97%	(DO + 1Hz) – 99%
Overfrequency	Source 1 and 2	103 – 105%	101% - (DO – 1Hz)
Voltage Unbalance	Source 1 and 2	5 – 20%	(UNBAL DO% - 2) – 3%

C. The normal and emergency sources shall include phase reversal protection. The preferred rotation is programmable as ABC or CBA.

2.9 TIME DELAYS

A. A time delay shall be provided on transfer to source 2, adjustable from 0 to 166 minutes.

B. A time delay shall be provided to override a momentary power outage or voltage fluctuation, adjustable from 0 to 120 seconds.

C. A time delay shall be provided on retransfer from source 2 to source 1, adjustable from 0 to 166 minutes.

D. A time delay shall be provided after retransfer that allows the generator to run unloaded prior to shutdown, adjustable form 0 to 166 minutes.

E. A time delay shall be provided for engine failure to start, adjustable 0- 60 seconds.

F. A pre and or post transfer time delay output adjustable from 0-120 seconds. The contact shall be a form-c contact rated for 10-Amp at 250-Vac and 10-Amp at 30-Vdc.

G. All delays shall be field adjustable from the microprocessor-based controller without the use of special tools.

2.10 ADDITIONAL FEATURES

A. One Form C contact for closure of the source 1 generator start circuit for optional use with a dual generator system. The contacts shall be rated for 5-Amp at 250-Vac and 5-Amp at 30-Vdc.

B. One Form C contact for closure of the source 2 generator start circuit. The contacts shall be rated for 5-Amp at 250-Vac and 5-Amp at 30-Vdc.

C. The controller shall include two independently programmable Engine Exercisers, selectable as disabled, 7, 14, or 28-day interval, or by calendar date. Run time shall be adjustable for 0-600 minutes, with or without load. Upon loss of source 2 power, the ATS shall automatically return to source 1. Transfer time delays shall also be independently programmable for test events.

D. The controller shall include a keypad pushbutton to initiate a system test.

E. The controller shall include 4 user configurable inputs. Each input provides 50 volts at 10ma and can be user configured to one of the following features:

1. Input to accept a remote contact, which closes to initiate a transfer to source 2. This feature shall be failsafe and an automatic retransfer shall occur in the event that source 2 power is lost.

2. Input to accept a remote contact, which closes to initiate a transfer to source 2. This feature shall be failsafe and an automatic retransfer shall occur in the event that source 2 power is lost.

3. Input to accept a remote contact, which opens to inhibit transfer to source 2.

4. Input to enable monitor mode to disable automatic operation of the transfer switch while continuing to display status. Monitor mode allows set point programming at the controller display.

5. Input to enable lockout feature to disable automatic operations of the transfer switch following an overcurrent trip of an integral circuit breaker.

6. Input to enable or disable manual retransfer to source 1.

7. Input to initiate manual retransfer to source 1.

8. Input to initiate a remote engine test. The test will run using the programmed engine test set points.

9. Input to select source 1 or source 2 as the preferred source.

10. Input to initiate a remote load test.

11. Input to indicate the bypass transfer switch is closed on a source.

12. Input to bypass time delays.

13. Input to receive engine start signal from a master controller in a three source application.

F. The controller shall include 4 user configurable outputs rated for 10-Amp at 250-Vac and 10-Amp at 30-Vdc. Each input can be user configured to one of the following features:

1. Source 1 connected

2. Source 2 connected

3. ATS in test

4. ATS not in automatic mode (Monitor Mode)

5. General Alarm indication for failure to transfer, mechanical fault, or electrical fault.
   a. Engine Test Aborted.
   b. Engine cool down in process.
   c. Engine start contact status.
   d. Emergency inhibit on.

e. Load sequence – Output used to signal select loads to disconnect prior to transfer and reconnect 0-120 seconds after. Loads are reconnected sequentially.

f. Selective load shed – Output used to shed low priority loads when the load reaches a programmed threshold value. A load shed and load restore set point (measured in kW) are associated with this feature.

g. Load bank control – Output to disconnect a load bank during an engine run test if a transfer to a source 2 generator is required.

h. Pre and/or post transfer signal - A pre and or post transfer time delay output adjustable from 0-120 seconds.

G. One Form C auxiliary contact to indicate Source 1 position and one Form C contact to indicate source 2 position. The contacts shall be rated for 10-Amp, 1/3-Horsepower at 250-Vac and 10-Amp at 30-Vdc.

H. One Form C contact for Source 1 Available. The contacts shall be rated for 10-Amp, 1/3-Horsepower at 250-Vac and 10-Amp at 30-Vdc.

I. One Form C contact for Source 2 Available. The contacts shall be rated for 10-Amp, 1/3-Horsepower at 250-Vac and 10-Amp at 30-Vdc.

J. Data Logging

1. Historical Data Storage to include:
   a. Engine Run Time
   b. Source 1 Available time
   c. Source 2 Available time
   d. Source 1 Connected time
   e. Source 2 Connected time
   f. Source 1 Engine Run Time
   g. Source 2 Engine Run Time
   h. Load Energized Time
   i. Number of Transfers

2. Event Summary shall include up to 100 date and time stamped events. All metered values are logged for each event. Event summaries include:
   a. Transfer events
   b. Alarms
   c. Changes to the set points
   d. Changes to the time/date
   e. Resetting a historical counter
   f. Engine Run test

3. Event Details shall include up to 350 date and time stamped events. All metered values are logged for each event. Event details include detailed sequence of operations of a transfer event.

4. Event recording shall capture 4 seconds of metered data, stored every 20 msec for certain events. The data is captured 2 seconds before and 2 seconds after the event. Oscillographic data for 10 events is stored and may be downloaded over USB. Events Include:

a. Source unavailability actions that initiate a transfer sequence (Undervoltage, Overvoltage, etc.).

b. Successful transfers (at the point of breaker/contactor closure).

c. Unsuccessful transfers (at the point of breaker/contactor failure to close or open).

2.11 OPTIONAL ACCESSORIES

A. Non-Automatic Control: Provide a 2-Position Selector Switch, maintained contact, marked: "Automatic" and "Non-Automatic." The transfer switch shall be transferred by actuating a two position maintained selector switch labeled "Source 1"and "Source 2." A 30mm pilot light shall be provided labeled "Not in Automatic."

B. Non-Automatic Control: Provide a 3-Position Selector Switch, maintained contact, marked: "Automatic" and "Non-Automatic." The transfer switch shall be transferred by actuating a three position maintained selector switch labeled "Source 1," "Off" and "Source 2." A 30mm pilot light shall be provided labeled "Not in Automatic."

C. Manual Retransfer Control: The ATS shall remain connected to the emergency source after the normal source becomes available until a momentary pushbutton contact closure signal is received to initiate the retransfer. Should a failure of the emergency source occur while waiting for the manual return, the re-transfer proceeds automatically.

D. Device panel mounted Preferred Source Selector switch

E. Device panel mounted Source 2 Inhibit keyed switch with 30mm white pilot light indicating inhibit status.

F. Device panel mounted selector switch to initiate a load transfer to source 2. This operation shall be failsafe to initiate an automatic retransfer upon loss of source 2 power.

G. Communications Interface shall be Modbus TCP/IP over Ethernet cable.

H. Where indicated on the drawings, provide a 100KA surge protection device on source 1.

I. Space heater with thermostat rated for 100 watts.

J. Integrated Load Metering – The controller shall include integral load metering. When included, metered values shall be viewable from the controller LCD display.

Source 1 Voltages (3Φ)

Source 2 Voltages (3Φ)

Load Voltages (3Φ)

Source 1 Frequency

Source 2 Frequency

Load Frequency

Load Currents (3Φ)

Load kW

Load kVar

Load kVA

pF

K. Annunciator and Controller integrated to enclosure:

7” touchscreen color display

L. Mimic bus display for transfer switch with indication of source availability, based on controller pickup and dropout settings, and switch position.

1. Indication of switch in test mode.

2. Indication of failure of digital communication link.

M. Control Functions

1. Control functions shall be password protected and shall include:
   a. Initiate engine test.
   b. Initiate a failsafe transfer to source 2.
   c. Initiate manual retransfer.

2. Indicating Lights: Grouped for each transfer switch monitored.

3. Label each group, indicating transfer switch it monitors, location of switch, and identity of load it serves.

N. Mounting: Flush, modular, steel cabinet, unless otherwise indicated.

O. Communications capability to be compatible with ATS controller.

2.12 PRODUCT OPTIONS AND FEATURES

A. Solid-state under voltage sensors to simultaneously monitor all phases of the normal power source and alternate utility source and arrange system for automatic transfer upon failure of or a drop below the adjustable percentage of the normal source voltage. Field adjustable from 85 to 100 percent of normal source voltage.

B. Retransfer of loads from alternate utility source to normal utility source shall be manually initiated.

C. Operating voltage for transfer shall be obtained from the source to which the load is to be transferred.

D. Provide 0 to 60-second adjustable timer for a "programmed transition," causing the switch to pause in the neutral position during transfer and retransfer for the set period.

E. Provide voltage supervisory relays on each phase, such that transfer is affected should normal three-phase supply fall below 70 percent on normal voltage.

F. Provide four (minimum) auxiliary contacts on shaft (field convertible). No common wires for contacts. Bring wires to terminal block, suitably labeled.

G. Provide indicating lights (door mounted) for the following:

1. Normal switch position.

2. Normal source available.

3. Emergency switch position.

H. Provide auxiliary contacts wired to a terminal block, suitably labeled, for connection to Owner's SCADA system for indication of the following conditions:

1. Normal source switch position.

2. Normal source available.

3. Alternate source switch position.

I. Provide any other accessories as may be required to achieve operation as described in this specification.

2.13 AUTOMATIC TRANSFER SWITCH CONTROLS

A. The transfer switch shall be equipped with a microprocessor based control system, to provide all the operational functions of the automatic transfer switch. The controller shall have two asynchronous serial ports. The controller shall have a real time clock with Nicad battery backup.

B. The CPU shall be equipped with self diagnostics which perform periodic checks of the memory I/O and communication circuits, with a watchdog/power fail circuit.

C. The controller shall use industry standard open architecture communication protocol for high speed serial communications via multi-drop connection to other controllers and to a master terminal with up to 4000 feet of cable, or further with the addition of a communication repeater. The serial communication port shall be RS422/485 compatible.

D. The serial communication port shall allow interface to either the manufacturer's or the Owner's supervisory control.

E. The controller shall have password protection required to limit access to qualified and authorized personnel.

F. The controller shall include a 20-character, LCD display, with a keypad, which allows access to the system.

G. The controller shall include three phase over/under voltage, over/under frequency, phase sequence detection and phase differential monitoring on both normal and alternate utility sources.

H. The controller shall be capable of storing the following records in memory for access either locally or remotely:

1. Number of hours transfer switch is in the emergency position (total since record reset).

2. Number of hours emergency power is available (total since record reset).

3. Total transfer in either direction (total since record reset).

4. Date, time, and description of the last four source failures.

I. Provision to select either "no commit" or "commit" to transfer operation in the event of a normal power failure shall be included. In the "no commit position," the load will transfer to the emergency position unless normal power returns before the emergency source has reach 90 percent of its rated values

(switch will remain in normal). In the "commit position," the load will transfer to the emergency position after any normal power failure. Keypad initiated.

J. A three-phase digital LCD voltage readout, with 1 percent accuracy shall display all three separate phase-to-phase voltages simultaneously, for both the normal and alternate utility source.

K. A digital LCD frequency readout with 1 percent accuracy shall display frequency for both normal and alternate utility sources.

L. An LCD readout shall display normal source and alternate utility source availability.

2.14 CONTROLLER

A. The controller shall also be capable of monitoring, logging and trending power data and shall include the following:

1. The controller shall be accurate to 1 percent measured. Voltage and current for all phases shall be sampled simultaneously to assure high accuracy in conditions of low power factor or large waveform distortions (harmonics).

2. The controller shall be capable of operating at nominal frequencies of 45 to 66 Hertz.

3. The controller shall accept inputs from industry standard current transformers (5A secondary). Direct phase voltage connections, 600 VAC and under, shall be possible without the use of PTs.

4. The controller shall be capable of being applied in single or 3-phase, three- and four-wire circuits.

5. All setup parameters required by the controller for power monitoring shall be stored in non-volatile memory and retained in the event of a control power interruption.

6. The following metered readings shall be communicated by the Controller, via local display and serial communication:

a. Current, per phase RMS.

b. Current unbalance percent.

c. Voltage, phase-to-phase and phase-to-neutral.

d. Voltage unbalance percent.

e. Real power (KW), per phase and three-phase total.

f. Apparent power (KVA), per phase and three-phase total.

g. Reactive power (KVAR), per phase and three-phase total.

h. Power factor, three-phase total and per phase.

i. Frequency.

j. Accumulated Energy (KWH, KVAH, and KVARH).

7. Displaying each of the metered quantities shall be accomplished through the use of menu scroll buttons.

8. Setup for systems requirements shall be allowed through the local access display. Setup provisions shall include:

   a. CT rating (1600: 5) on load terminals.

   b. System type (single; 3 phase; 3- or 4-wire).

9. Reset of the following electrical parameters shall also be allowed from the local access display:

   a. Real Energy (KWH).

   b. Apparent Energy (KVAH).

   c. Reactive Energy (KVARH).

10. All reset and setup functions shall have a menu for protection against unauthorized/accidental changes.

11. The controller shall be capable of storing records in memory for access either locally or remotely for up to 100 events. The reports shall include date, time and a description of the event and shall be maintained in a non-volatile memory.

2.15 ACCESSORIES

A. The following accessories shall be available by simple activation, via the key pad, if required.

1. Include two time delay contacts that open simultaneously just (milliseconds) prior to transfer in either direction. These contacts close after a time delay upon transfer. Programmable 0-9999 seconds after transfer.

2. A load shed function shall be included to disconnect the load from the alternate utility source when an overload condition occurs.

2.16 MOUNTING

A. Automatic transfer switches are to be pad mounted.

PART 3 EXECUTION

3.1. GENERAL

A. Standards and Tests - Equipment covered by these specifications shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of all applicable published ANSI, NEMA, and IEEE standards, and the requirements of the NEC.

B. The Contractor shall submit shop and field test reports and conduct field tests.

C. Owner Acceptance - Final acceptance by the Owner or his duly authorized representative of this equipment shall be contingent upon the equipment satisfactorily meeting these specifications and tests stipulated herein.

3.2. PREPARATION

A. Provide dimensions and weights to the Contractor for his use in providing housekeeping pads where pad mounting is shown. Coordinate installation sequence with the Contractor.

3.3. INSTALLATION

A. The transfer switch and all necessary appurtenances and/or accessories shall be installed in accordance with the manufacturer's installation instructions, approved shop drawings, Contract Drawings and this section.

B. The Contractor shall field verify existing conditions and shall notify the Owner's Representative of any conditions that need to be corrected prior to commencing the work of this Section. Commencement of work by the Contractor is acceptance of existing conditions.

C. A manufacturer's representative shall supervise, check or assist in the installation of the transfer switch.

D. Provide engraved plastic nameplates.

3.4. FIELD TESTING

A. Field tests shall be conducted on the transfer switch to ensure that the equipment is assembled and installed in accordance with the manufacturer's installation instructions, approved shop drawings, Contract Drawings, and this section. The primary goal of field testing is to ensure the proper installation, setup and operation of equipment or systems. Field testing includes all testing, measuring and adjusting of equipment or systems by the Contractor and/or manufacturer's representative prior to performance testing.

B. Field tests shall be conducted in accordance with the manufacturer's instructions and requirements.

C. Deficiencies identified during field tests shall be corrected.

D. All labor, equipment, water, special tools or apparatus and supplies required for field tests shall be supplied by the Contractor.

E. Field tests shall include, but are not limited to the following, where applicable:

1. Checking the voltage to a piece of equipment or system.

2. Checking the rotation of a motor.

3. Checking the clearance between mounting and mating surfaces.

4. Testing the operation of a manually operated or motorized piece of equipment to ensure smooth operation of mechanisms.

5. Checking the flow rate through a piece of equipment, system or structure.

6. Testing the operation of equipment controls.

7. Any testing of the operation of a piece of equipment or system prior to performance testing.

3.5. PERFORMANCE TESTING AND REPORTING

A. Performance tests shall be conducted on the transfer switch. Performance testing consists of extended duration operation, under actual working or design conditions, of all facility equipment and systems. Installation and all other field testing and adjustments to equipment and systems shall be completed and checked by a manufacturer's representative prior to performance testing. A manufacturer's representative shall be present during performance testing. A startup report outlining the results of performance testing shall be prepared by the manufacturer's representative and submitted to the Engineer.

B. OWNER to provide ATS controller settings prior to performance testing.

C. Performance tests shall be conducted in accordance with the manufacturer's instructions and requirements.

D. Performance tests shall also be performed in accordance with NETA-Acceptance Testing Specification, Article 7.22.3, latest edition.

E. Deficiencies identified during performance tests shall be corrected and the performance test shall be resumed.

F. All labor, equipment, special tools or apparatus and supplies required for performance tests shall be supplied by the Contractor.

3.6. SERVICES OF MANUFACTURER'S REPRESENTATIVE

A. The Contractor shall arrange for the equipment manufacturer to furnish the services of an authorized and qualified factory representative. The manufacturer's representative shall be available to perform the services listed for the durations required. Testing shall be conducted by representatives of the manufacturer during the Owner's normal working hours. The Engineer and Owner shall be notified one week in advance in writing and shall witness the tests. Tests to be conducted on-site shall include, but not be limited to, transfer and re-transfer underload.

B. The manufacturer's representative shall prepare a written start-up report at the conclusion of performance testing. The start-up report shall include an installation certification and shall be submitted directly to the Engineer.

3.7. APPROVALS

A. As a condition of approval, the manufacturer of the automatic transfer switches shall verify that their switches are listed by Underwriters Laboratories, Inc., Standard UL-1008 with three-cycle short circuit closing and withstand.

B. During the three-cycle closing and withstand tests, there shall be no contact welding or damage. The three-cycle tests shall be performed without the use of current limiting fuses. The test shall verify that contacts separation has not occurred, and there is contact continuity across all phases. Test procedures shall be in accordance with UL-1008, and testing shall be certified by Underwriters' Laboratories, Inc.

C. When conducting temperature rise tests to UL-1008, the manufacturer shall include post-endurance temperature rise tests to verify the ability of the transfer switch to carry full rated current after completing the overload and endurance tests.

D. The microprocessor controller shall meet the following requirements:

1. Storage Conditions - 25 degrees C to 85 degrees C.

2. Operation Conditions - 20 degrees C to 70 degrees C ambient.

3. Humidity 0 to 99 percent relative humidity, noncondensing.

4. Capable of withstanding infinite power interruptions.

5. Surge withstand per ANSI/IEEE C-37.90A-1978.

3.8. DEMONSTRATION

A. Provide systems demonstration.

B. Demonstrate operation of transfer switch in normal and alternate utility source modes.

END OF SECTION

SECTION 16410

POWER DISTRIBUTION AND CONTROL EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section defines minimum requirements for the project switchgear, power distribution, lighting panelboards, and control equipment work.

1.2 RELATED SECTIONS

A. This section work shall be as specified in the following related sections:

1. Section 01010 - Summary of Work
2. Division 16 - Electrical

1.3 REFERENCES

A. CONTRACTOR'S work shall comply with the latest requirements of all applicable codes, standards, guides, practices and local regulations pertaining to the job at the time of bidding, and it shall carry approval labels where required. As a minimum, the following shall apply:

1. ANSI-C37.20 – Switchgear Assemblies
2. ANSI-C37.13 – Low Voltage Power Circuit Breakers
3. ANSI-C37.17 – Trip Devices
4. UL 1558 Low Voltage Switchgear
5. UL 1066 Low Voltage Power Circuit Breakers
6. NFPA 70 – National Electrical Code (NEC)
7. NFPA 70E – Standard for Electrical Safety in the Workplace
8. IEEE C2 – National Electrical Safety Code
9. OSHA CER 1910, Subpart S – Electrical General, Parts 1 & 2
10. NEMA AB 1 - Molded Case Circuit Breakers
11. NEMA ST 20 – Dry Type Transformers for General Application
12. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies
13. NEMA ICS 3 – Industrial Control and Systems: Factory Built Assemblies
14. NEMA ICS 6 – Enclosures for Industrial Controls and Systems

15. NEMA ICS 7 – Industrial Control and Systems: Adjustable Speed Drives

16. NEMA KS 1 - Enclosed Switches

17. NEMA PB 1 - Panelboards

1.4 SUBMITTALS

A. See appropriate sections of Division 1 for submittal procedures.

B. Shop Drawings: Indicate outline and support point dimensions, nameplate schedule, schematic diagrams, product data sheets, front and plan views, cable terminal sizes, conduit space locations, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and switch arrangement and sizes. Where applicable submit busway connections, front and plan view of close-coupled assemblies, interlock scheme drawings and sequence of operations, automatic transfer sequence of operations, and bus size and color.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual locations of switchgear and panelboards and record actual circuiting arrangements.

E. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Perform Work in accordance with NECA Standard of Installation.

C. Maintain one copy of document on site.

D. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 5 years’ experience.

E. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store in clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

1.7 WARRANTY

A. Full warranty against defects in materials and workmanship for two years after final acceptance by the Owner, including all parts, labor, and expenses.

1.8 MAINTENANCE MATERIALS

A. Furnish two of each panelboard key.

B. Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

PART 2 PRODUCTS

2.1 GENERAL MATERIAL REQUIREMENTS

A. All equipment shall be as shown on the Contract Drawings, specified herein, and as necessary and required to complete the Project.

B. Manufacturers

1. Eaton.

2. Square D.

3. Or approved equal.

2.2 APPARATUS

A. Main Circuit Breaker Cubical shall include, but not limited to:

1. NEMA 1 Enclosure.

2. 4000A bus. Cable connections lineside, cable connections loadside.

3. 4000A 3P Magnum SB Brkr, Draw Out, Electrically Operated w/ LSIG adj Trip and AIC rating of 100kA, which exceeds the available fault current.

4. Surge Protector.

5. Ancillary devices as required.

B. Distribution Cubicals (load side of ATS) shall include, but not limited, to

1. NEMA 1 Enclosures.

2. 4000A bus. Cable or bus connections from ATS, cable connections loadside of each Feeder Brkr.

3. Five 1200A 3P Magnum SB Brkr, Drawout Mounted, Electrically Operated w/ LSIG adj Trip & sub-metering and AIC rating of 100kA, which exceeds the available fault current.

4. One 800A 3P Magnum SB Brkr, Drawout Mounted, Electrically Operated w/ LSIG adj Trip ad sub-metering.

5. Two provisions for 800A 3P Magnum SB Brkr, Drawout Mounted, Electrically Operated Brkr.

6. Power Xpert Meter 2270 (Model: PXM2270MA65105) with 2000A CTs on main bus.

7. Ancillary devices as required.

2.3 RATINGS

A. Voltage rating shall be as indicated on the drawings. The entire assembly shall be suitable for 600 volts maximum ac service.

B. The assembly shall be rated to withstand mechanical forces exerted during short-circuit conditions when connected directly to a power source having available fault current of 85,000 amperes symmetrical at rated voltage

C. The bus system shall have a minimum ANSI short-circuit withstand rating of 100,000 amperes symmetrical tested in accordance with ANSI C37.20.1 and UL1558.

D. All circuit breakers shall have a minimum symmetrical interrupting capacity of 85,000 amperes. To ensure a fully selective system, all circuit breakers shall have 30 cycle short-time withstand ratings equal to their symmetrical interrupting ratings through 85,000 amperes, regardless of whether equipped with instantaneous trip protection or not.

E. All ratings shall be tested to the requirements of ANSI C37.20.1, C37.50 and C37.51 and UL 1558 witnessed and approved.

2.4 CONSTRUCTION

A. The switchgear shall consist of the required number of vertical sections bolted together to form a rigid assembly. The sides shall be covered with removable bolt-on covers. All edges of front covers or hinged front panels shall be formed. Provide ventilators located on the top of the switchgear over the breaker and bus compartments to ensure adequate ventilation within the enclosure. Cable compartment access shall be provided by hinged rear doors, complete with quarter turn latches and provisions for padlocking.

B. The assembly shall be provided with adequate lifting means and shall be capable of being moved into installation position and bolted directly to the floor without the required use of floor sills providing the floor is level to 1/8 inch per 3-foot distance in any direction. Provisions shall be made for jacking of shipping groups, for removal of skids or insertion of equipment rollers. Base of assembly shall be suitable for rolling directly on pipes without skids. The base shall be equipped with slots in the base frame members to accommodate the use of pry bars for moving the equipment to its final position.

C. Each vertical steel unit forming part of the switchgear line-up shall be a self-contained housing having one or more individual breaker or instrument compartments, a centralized bus compartment and a rear cable compartment. Each individual circuit breaker compartment, or cell, shall be segregated from adjacent compartments and sections by means of steel barriers to the maximum extent possible. It shall be equipped with drawout rails and primary and secondary disconnecting contacts. Removable hinge pins shall be provided on the breaker compartment door hinges. Current transformers for feeder instrumentation, where shown on the plans, shall be located within the appropriate breaker cells and be front accessible, removable, and provided with shorting terminal blocks in the front wireway. Circuit breaker doors shall not be ventilated.

D. The stationary part of the primary disconnecting devices for each power circuit breaker shall be breaker mounted and consist of a set of contacts extending to the rear through a glass polyester insulating support barrier; corresponding moving finger contacts, suitably spaced, shall be furnished on the power circuit breaker studs, which engage in only the connected position. The assembly shall provide multiple silver-to-silver full floating high pressure point contacts with uniform pressure on each finger maintained by springs. Each circuit shall include the necessary three-phase bus connections between the section bus and the breaker line side studs. Bus extensions shall be plated similarly to the main bus where outgoing terminals are attached.

E. The circuit breaker door design shall be such that the following functions may be performed without the need to open the circuit breaker door: lever circuit breaker between positions, operate manual charging system, close and open circuit breaker, examine and adjust trip unit, and read circuit breaker rating nameplate.

F. The secondary disconnecting devices shall consist of floating terminals mounted on the stationary unit and engaging mating contacts at the front of the breaker. The breaker secondary disconnecting devices shall be maintained in the “connected” and “test” positions.

G. The removable power circuit breaker element shall be equipped with disconnecting contacts and interlocks for draw-out application. It shall have four positions, “connected,” “test,” “disconnected” and “removed.” The breaker draw-out element shall contain a worm gear levering “in” and “out” mechanism with removable lever crank. Levering shall be accomplished via the use of conventional tools. Mechanical interlocking shall be provided so that the breaker is in the tripped position before levering “in” or “out” of the cell. Interlocking that trips the breaker will not be accepted. The breaker cell shall include an optional provision for key locking open to prevent manual or electric closing. Padlocking shall provide for securing the breaker in the connected, test, or disconnected position by preventing levering. Breaker shall be ready to accept connection of remote racking device without modification of breaker, cell or door.

H. An insulating flash shield shall be mounted above each circuit breaker to prevent flashover from the arc chutes to ground.

I. The switchgear shall be Eaton Magnum DS low voltage metal-enclosed switchgear, utilizing Magnum DS power circuit breakers as herein specified.

J. Provide a glass polyester full height and depth barrier between adjacent vertical structures in the bus compartment with appropriate slots for main bus.

K. Where shown on the drawings, the switchgear shall be suitable for use as service entrance equipment and be labeled in accordance with UL requirements.

L. Provide a rear compartment barrier between the cable compartment and the main bus to protect against inadvertent contact with main or vertical bus bars. Barrier shall be solid grounded steel

M. Provide a safety shutter in the cell when the circuit breaker is withdrawn, which automatically covers the line and load stabs and protects against incidental contact. Provide padlockable breaker door to prevent access to shutter when breaker is removed from cell.

N. Provide a metal barrier full height and depth between adjacent vertical structures in the cable compartment.

2.5 BUS

A. All bus bars shall be silver-plated copper. Main horizontal bus bars shall be mounted with all three phases arranged in the same vertical plane. Bus sizing shall be based on ANSI standard temperature rise criteria of 65 degrees C over a 40 degrees C ambient (outside the enclosure).

B. Provide a full capacity neutral bus where a neutral bus is indicated on the drawings.

C. A copper ground bus shall be furnished firmly secured to each vertical section structure and shall extend the entire length of the switchgear. The ground bus short-time withstand rating shall meet that of the largest circuit breaker within the assembly. The ground bus plating shall match main bus plating.

D. All hardware used on conductors shall be high-tensile strength and zinc-plated. All bus joints shall be provided with Belleville-type washers.

E. The primary means of insulation and isolation of main and vertical bus shall be by air gap. Minimal use of insulating material in addition to air gap shall be provided.

2.6 WIRING/TERMINATIONS

A. Small wiring, necessary fuse blocks and terminal blocks within the switchgear shall be furnished as required. Control components mounted within the assembly shall be suitably marked for identification corresponding to the appropriate designations on manufacturer's wiring diagrams.

B. Provide a front accessible, isolated vertical wireway for routing of factory and field wiring. Factory provisions shall be made for securing field wiring without the need for adhesive wire anchors.

C. Front access to all circuit breaker secondary connection points shall be provided for ease of troubleshooting and connection to external field connections without the need of removing the circuit breaker for access.

D. All control wire shall be type SIS. Control wiring shall be 14 ga for control circuits and 12 ga for current transformer circuits. Wire bundles shall be secured with nylon ties and anchored to the assembly with the use of pre-punched wire lances or nylon non-adhesive anchors. All current transformer secondary leads shall first be connected to conveniently accessible shorting terminal blocks before connecting to any other device. Shorting screws with provisions for storage shall be provided. All groups of control wires leaving the switchgear shall be provided with terminal blocks with suitable numbering strips and provisions for #10 AWG field connections. Each control wire shall be marked to the origin zone/wire name/destination zone over the entire length of the wire using a cured ink process. Plug-in terminal blocks shall be provided for all shipping split control wires. Terminal connections to remote devices or sources shall be front accessible via doors above each circuit breaker.

E. NEMA 2-hole mechanical- type lugs shall be provided for all line and load terminations suitable for copper or aluminum cable rated for 75 degrees C of the size indicated on the drawings.

F. Lugs shall be provided in the incoming line section for connection of the main grounding conductor and at each end of the ground bus for connection to system ground. Additional lugs for connection of other grounding conductors shall be provided as indicated on the drawings.

G. Include dedicated pull-apart terminal blocks and pre-made harnesses associated with wiring control and communications devices between the low voltage switchgear and the dry-type substation transformer.

2.7 CIRCUIT BREAKERS

A. All protective devices shall be low voltage power circuit breakers, Eaton type Magnum DS or approved equal. All breakers shall be UL listed for application in their intended enclosures for 100% of their continuous ampere rating.

B. All power circuit breakers shall be constructed and tested in accordance with ANSI C37.13, C37.16, C37.17, C37.50, and UL 1066. The breaker shall carry a UL label.

C. Breakers shall be provided in drawout configuration. All breaker cell sizes shall have a common height and depth. Breaker frames of the same size shall be fully interchangeable.

D Power circuit breakers shall utilize a two-step stored-energy mechanism to charge the closing springs. The closing of the breaker contacts shall automatically charge the opening springs to ensure quick-break operation. Slow closing speed shall not be required to properly maintain the breaker contacts.

E. Breakers shall be manually operated (MO) unless electrically operated (EO) is indicated on the drawings.

F. Electrically operated breakers shall be complete with 120 Vac motor operators. The charging time of the motor shall not exceed 6 seconds.

G. To facilitate lifting, the power circuit breaker shall have integral handles on the side of the breaker.

H. The power circuit breaker shall have a closing time of not more than 3 cycles.

I. The primary contacts shall have an easily accessible wear indicator to indicate contact erosion.

J. The power circuit breaker shall have three windows in the front cover to clearly indicate any electrical accessories that are mounted in the breaker. The accessory shall have a label that will indicate its function and voltage. The accessories shall be plug and lock type and UL listed for easy field installation. They shall be modular in design and shall be common to all frame sizes and ratings.

K. The breaker control interface shall have color-coded visual indicators to indicate contact open or closed positions, as well as mechanism charged and discharged positions. Manual control pushbuttons on the breaker face shall be provided for opening and closing the breaker. The power circuit breaker shall have a "Positive On" feature. The breaker flag will read "Closed" if the contacts are welded and the breaker is tripped or opened.

L. The current sensors shall have a back-cover window that will permit viewing the sensor rating on the back of the breaker. A rating plug will offer indication of the rating on the front of the trip unit. The current sensor and rating plug shall be of the same current rating.

M. A position indicator shall be located on the faceplate of the breaker. This indicator shall provide color indication of the breaker position in the cell. These positions shall be Connect (Red), Test (Yellow), and Disconnect (Green). The levering door shall be interlocked so that when the breaker is in the closed position, the breaker levering-in door shall not open.

N. Each power circuit breaker cell shall offer sixty (60) front-mounted dedicated secondary wiring points. Each wiring point shall have finger safe contacts, which will accommodate #10 AWG maximum field connections with ring tongue, spade terminals or bare wire.

2.8 TRIP UNITS

A. Each low voltage power circuit breaker shall be equipped with a solid-state tripping system consisting of three current sensors, microprocessor-based trip device and flux-transfer shunt trip. Current sensors shall provide operation and signal function. The trip unit shall use microprocessor-based technology to provide the basic adjustable time-current protection functions. True rms sensing circuit protection shall be achieved by analyzing the secondary current signals received from the circuit breaker current sensors and initiating trip signals to the circuit breaker trip actuators when predetermined trip levels and time delay settings are reached. Interchangeable current sensors with their associated rating plug shall establish the continuous trip rating of each circuit breaker. The trip unit shall be Eaton type Digitrip RMS 1150+.

B. The trip unit shall have an information system that utilizes battery backup LEDs to indicate mode of trip following an automatic trip operation. The indication of the mode of trip shall be retained after an automatic trip. A reset button shall be provided to turn off the LED indication after an automatic trip. A test pushbutton shall energize a LED to indicate the battery status.

C. The trip unit shall be provided with a display panel, including a representation of the time/current curve that will indicate the protection functions. The unit shall be continuously self-checking and provide a visual indication that the internal circuitry is being monitored and is fully operational.

D. The trip unit shall be provided with a making-current release circuit. The circuit shall be armed for approximately two cycles after breaker closing and shall operate for all peak fault levels above 25 times the ampere value of the rating plug.

E. Trip unit shall have selectable powered and unpowered thermal memory for enhanced circuit protection.

F. Complete system selective coordination shall be provided by the addition of the following individually adjustable time/current curve shaping solid-state elements:

1. All circuit breakers shall have adjustments for long delay pickup and time.

2. All circuit breakers shall have individual adjustments for short delay pickup and time, and include I2t settings.

3. All circuit breakers shall have an adjustable instantaneous pickup.

4. All circuit breakers, where indicated on the drawings, shall have individually adjustable ground fault current pickup and time, and include I2t settings or ground alarm only.

G. The trip unit shall have provisions for a single test kit to test each of the trip functions.

H. Where shown on the drawings, switchgear shall be wired for zone selective interlocking for the power breakers within the switchgear. The trip units shall include zone interlocking for the short-time delay and ground fault delay trip functions for improved system coordination and enhanced bus protection. The zone interlocking system shall restrain the tripping of an upstream breaker and allow the breaker closest to the fault to trip with no intentional time delay. In the event the downstream breaker does not trip, the upstream breaker shall trip without the preset time delay.

I. The trip unit shall be equipped to permit communication via a network twisted pair for remote monitoring.

J. The trip unit shall utilize ARMS (Arc flash Reduction Maintenance System). ARMs shall be provided in a system that shall reduce the trip unit Instantaneous pickup value when activated. ARMS device shall not compromise breaker phase protection even when enabled. Once the ARMs unit is disabled, the recalibration of trip unit phase protection shall not be required. Activation and deactivation of ARMS setting shall be accomplished without opening the circuit breaker door and exposing operators to energized parts. ARMS shall provide a clearing time of 0.04 seconds, adjustable with a minimum of five settings ranging from 2.5X to 10X of the sensor value.

1. ARMS shall be enabled via a switch on the trip unit. It shall also provide confirmation of protection via a Blue LED.

2. ARMS shall be provided with remote “enable/disable” control

3. ARMS shall be provided with a switchgear panel mounted enable padlockable selector switch and indication via Blue LED pilot light.

K. The trip unit shall be equipped to permit communication for remote monitoring and control.

L. The trip unit shall include a power/relay module, which shall supply control to the display. Following an automatic trip operation of the circuit breaker, the trip unit shall maintain the cause of trip history and the mode of trip LED indication.

M. The trip unit shall include a voltage transformer module, suitable for operation up to 600V, 50/60 Hz. The primary of the voltage transformer module shall be connected internally to the line side of the circuit breaker through a dielectric test disconnect plug.

N. The display for the trip units shall be a 24-character LED display. Metering display accuracy of the complete system, including current sensors, auxiliary CTs, and the trip unit, shall be +/- 1% of full scale for current values. Metering display accuracy of the complete system shall be +/- 2% of full scale for power and energy values.

O. The unit shall monitor the following data:

1. Instantaneous value of phase, neutral and ground current.

2. Instantaneous value of line-to-line voltage.

3. Minimum and maximum current values.

4. Watts, vars, VA, watthours, varhours and VA hours.

P. The energy-monitoring parameter values (peak demand, present demand, and energy consumption) shall be indicated in the trip unit's alphanumeric display panel.

Q. The trip unit shall display the following power quality values: crest factor, power factor, percent total harmonic distortion, and harmonic values of all phases through the 31st harmonic.

R. An adjustable high load alarm shall be provided, adjustable from 50 to 100% of the long delay pickup setting.

S. The trip unit shall contain an integral test pushbutton. A keypad shall be provided to enable the user to select the values of test currents within a range of available settings. The protection functions shall not be affected during test operations. The breaker may be tested in the TRIP or NO TRIP test mode.

T. Programming may be done via a keypad at the faceplate of the unit or via the communication network.

U. System coordination shall be provided by the following microprocessor-based programmable time-current curve shaping adjustments. The short-time pickup adjustment shall be dependent on the long delay setting.

1. Programmable long-time setting.

2. Programmable long-time delay with selectable I2t or I4t curve shaping.

3. Programmable short-time setting.

4. Programmable short-time delay with selectable flat or I2t curve shaping, and zone selective interlocking.

5. Programmable instantaneous setting.

6. Programmable ground fault setting trip or ground fault setting alarm.

7. Programmable ground fault delay with selectable flat or I2t curve shaping and zone selective interlocking.

V. The trip unit shall offer a three-event trip log that will store the trip data, and shall time and date stamp the event.

W. The trip unit shall have the following advanced features integral to the trip unit:

1. Adjustable undervoltage release.

2. Adjustable overvoltage release.

3. Reverse load and fault current.

4. Reverse sequence voltage alarm.

5. Underfrequency.

6. Overfrequency.

7. Voltage phase unbalance and phase loss during current detection.

X. The trip unit shall offer information on the circuit breaker's health. The data available shall include total number of all Instantaneous and Short Delay trips seen by the circuit breaker, an additional count of all the overloads and ground fault trips seen by the circuit breaker, an operation counter, a time stamp of the last breaker operation, and the maximum temperature seen by the trip unit. All these data points will be stored in non- volatile memory and available for remote communications.

2.9 MISCELLANEOUS DEVICES

A. Key interlocks shall be provided as indicated on the drawings. These interlocks shall keep the circuit breakers trip-free when actuated.

B. Each section of the switchgear shall be provided with a 240V space heater operated at 120vacthermostatically controlled. Power for the space heaters shall be obtained from a control power transformer within the switchgear. Fused control power transformers shall be provided as required for proper operation of the equipment. A manual disconnect shall be provided ahead of the primary fuses. If part of substation, the control power transformers shall have adequate capacity to supply power to the transformer cooling fans.

2.10 METERING, MONITORING AND CONTROL

A. Power Xpert Meter Series, PXM2270.

1. Where indicated on the drawings, provide a microprocessor based Power Quality Meter(s), designated (PQM), equal to Eaton PXM2270 series meters.

2. A complete PQM combination meter base and/or display shall be have the following minimum listings and/or certifications:

   a. Safety: UL 61010-1, EN 610101.

   b. Accuracy: ANSI C12.20 Class 0.2, IEC/EN60687 0.2 for revenue meters.

   c. EMC: FCC Part 15 Subpart B Class A immunity.

   d. IEC Standards: 50081-2, 61000-3, 61000-4, and 61326.

3. The PQM shall be supplied suitable for standard 120/240 Vac or 110/250 Vdc inputs as required or indicated on the drawings.

4. Current inputs for each channel shall be from standard instrument current transformers.

a. The analog current input shall be converted to 4096 samples per cycle with a delta-sigma converter digitally filtered down to 512 samples per cycle for anti-aliasing.

b. Meter burden shall be less than 10 milliohms.

c. Overload withstand capability shall be a minimum of 500A for 1 second, non-repeating.

d. Input range capability shall be 0.005 to 20 amperes.

5. Voltage inputs for each channel shall allow for connection into circuits with the following parameters:

a. Input range of 600V L-L, 347V L-N direct connected.

b. PT primary input of 120 volts to 500,000 volts.

c. Nominal full-scale value of 700 volts rms.

d. Input impedance of 2 mega ohms.

e. The analog voltage input shall be converted to 4096 samples per cycle by means of a delta sigma converter and digitally filtered down to 512 samples per cycle for anti-phasing.

6. The PQM shall be capable of monitoring, displaying, and communicating the below true rms minimum information where applicable with the accuracy as indicated of read or calculated values based on 3 to 300% full scale. The PQM shall be suitable for installation in single phase, two or three wire systems or in three phase, three or four wire systems.

a. AC current (amperes) in A, B and C phase, 3-phase average, Neutral (N) and Ground (G). A total of five (5) current inputs shall be provided. Accuracy of all current inputs shall be 0.05% reading, +/- 0.01% of full scale.

b. AC voltage (volts) for A-B, B-C and C-A, phase average, A-N, B-N and C-N, average phase to N, and N to G. Accuracy of all voltage inputs shall be +/- 0.1% reading, +/-0.05% maximum of full scale.

c. Real Power (Watts), Reactive Power (vars), Apparent Power (VA), for each phase and system. Accuracy +/- 0.10% reading and +/- 0.0025% full scale. Forward/Reverse indication shall be provided.

d. Accumulated, Incremental and conditional measurement for Real Energy (WH), Reactive Energy (VARH), Apparent Energy (VAH) for each phase and system. Accuracy +/- 0.10% reading and +/- 0.0025% full scale. Forward/Reverse and Net difference indication shall be provided.

e. Frequency (Hz) Accuracy +/- 0.01 hertz.

f. Demand values including present, running average, last complete interval and peak for System Current (Amperes). Demand values including present, running average, last complete interval, peak and coincident with peak kVA and kW demand for System Real Power (Watts), System Reactive Power (vars), and System Apparent Power (VA).

g. Power Factor for both Displacement only 60-cycle fundamental Watts to VA and Apparent total Watts to total vars including harmonics for A, B and C phase and 3 phase average. Accuracy +/- 0.10% at unity PF and +/-0.30% at 0.5 PF.

h. Current percent Total Harmonic Distortion (THD) in A, B and C phase and N.

i. Voltage percent THD in A-B, B-C and C-A phase, A-N, B-N and C-N.

j. K-Factor (sum of the squares of harmonic currents times the square of their harmonic numbers).

k. Transformer Derating Factor (1.414 divided by the Crest Factor).

l. Crest Factor (ratio of peak current to rms current).

m. CBEMA (ITIC) curve data.

n. Flicker data.

o. Nines (9's) availability data.

p. Power Quality Index.

7. The PQM shall provide the following advanced analysis features:

a. Calculation of harmonic magnitudes and phase angle for each phase voltage and current through the 85th harmonic.

b. Waveforms shall be available in non-volatile memory and retrievable via file transfer protocol (ftp) in COMTRADE file format over the Internet network.

c. Historical trend logging for graphical viewing from the Local PX-D display or from an embedded WEB server. Data storage available shall be 4GB, non-volatile.

d. Energy profile data shall include recording of real and reactive energy forward, reverse, net and absolute sum as well as apparent energy (KVAH).

e. The PX-M shall include the following trigger options:

1) Out of limits – one hundred and five (105) triggers.

2) Demand overload – Ten (10) triggers.

3) Sub-cycle disturbance – dV/dt and absolute.

4) ITIC curve display sag or swell voltage events – Eight (8) triggers.

f. Event Logging: The PX-M or embedded WEB Server shall allow the user to view a list of triggered events along with any captured parameters, event details, and triggered waveforms.

g. Sag/Swell and Waveform recording: Sixty (60) cycles of waveform shall be recorded at 512 samples per cycle including 30 cycles of pre and post event data. The embedded WEB server shall be capable of supporting viewing of all triggered waveforms one channel at a time and shall include the ability to zoom and to scroll horizontally using a slider bar. Waveforms shall be stored in non-volatile flash memory.

h. Minimum and Maximum values for voltage, current, apparent and displacement PF, all power quantities, THD voltage and current, and frequency.

8. The PQM shall have a digital Input/Output (I/O) card, which shall include:

   a. Eight (8) digital inputs – self sourced 24 Vdc.

   b. Three (3) relay outputs – 5A maximum form C continuous, 380Vac maximum, 125Vdc maximum. Outputs shall be suitable for KYX or alarm annunciation. Relay outputs shall have the following minimum ratings:

      1) Make: 30A, 30 Vdc, 120-240 Vac.

      2) Break: 5A, 30 Vdc, 120-240 Vac.

      3) Resistive load: 0.5A, 125Vdc; 0.25A, 250 Vdc.

      4) Output Relay when event triggered shall be capable of operating in timed, normal or latched mode.

   c. Two (2) solid state outputs – 80 mA maximum continuous, 30 Vdc maximum.

9. The PQM shall be provided with multiple communications ports and non-proprietary protocols shall be provided native to the device as noted on the contract documents.

10. The PXM468K-DISP-12 inch 1024 x 768 pixel backlit LCD graphical touch screen display shall provide full access to all measured and stored parameters in the meter. It shall also provide graphical real time information, trend charts of key circuit measurements, waveform, harmonics and calendar displays.

11. The WEB server shall provide the user with remote WEB access to all the metered, trend and waveform information. The WEB server shall include real time monitored information in both numeric and graphical visual formats.

12. A reset button shall be provided on the meter to be able to reset communications to factory defaults. Reset capabilities shall be provided in conjunction with various lockable dip switch settings

13. The 12 inch display and meter shall be capable of providing the graphically display of the following Main Meter Menu Screens, including Overview, Trends, Energy, timeline, and I/O.

B. Web-Enabled Communications

1. Where indicated on the drawings, provide a separate compartment with a front facing hinged door as a central point of connection for all internally located communicating devices to an external Ethernet network and allow close monitoring of the power infrastructure with real-time, web-enabled data.

2. The compartment shall have a hinged door with a functional through-the-door RJ45 network access port. Power for the components in the compartment shall be supplied by a pre-wired, bus-connected control transformer in the compartment that is fused and has a disconnecting means.

3. The communication protocol shall be Ethernet Modbus TCP either native to the metering device or following interconnection to Eaton PowerXpert Gateway.

2.11 ENCLOSURES

A. NEMA 1 Enclosures.

2.12 NAMEPLATES

A. Engraved nameplates, mounted on the face of the assembly, shall be furnished for all main and feeder circuits as indicated on the drawings. Nameplates shall be laminated plastic, black characters on white background, and secured with screws. Characters shall be 3/16-inch high, minimum.

B. Furnish master nameplate giving switchgear designation, voltage ampere rating, short-circuit rating, and manufacturer's name.

C. Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification corresponding to appropriate designations on manufacturer's drawings.

2.13 ACCESSORES

A. Provide a traveling type circuit breaker lifter, rail-mounted on top of switchgear.

B. Provide floor running portable circuit breaker transfer truck with manual lifting mechanism.

C. A remote racking and operation device shall be provided for operation of the circuit breakers from a distance. No modification of breaker, cell or door shall be necessary to use the device. Opening and closing electrically and manually operated devices shall be possible.

2.14 SURGE PROTECTIVE DEVICES

A. For the equipment specified herein, the manufacturer shall be ISO 14001 and ISO 9001 or 9002 certified.

B. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of twenty-five (25) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

C. The SPD shall be UL 1449 4th edition listed, 20 kA I_n Type 1 or Type 2 for use in UL 96A systems.

D. Unit Operating Voltage – Refer to drawings for operating voltage and unit configuration.

E. Maximum Continuous Operating Voltage (MCOV) – The MCOV shall not be less than 115% of the nominal system operating voltage.

F. The suppression system shall incorporate thermally protected metal-oxide varistors (MOVs) as the core surge suppression component for the service entrance and all other distribution levels. The system shall not utilize silicon avalanche diodes, selenium cells, air gaps, or other components that may crowbar the system voltage leading to system upset or create any environmental hazards. End of life mode to be open circuit. Unit with end of life short-circuit mode are not acceptable.

G. Unit shall operate without the need for an external overcurrent protection device (OCPD), and be listed by UL as such. Unit must not require external OCPD or replaceable internal OCPD for the UL Listing.

H. Protection Modes – The SPD must protect all modes of the electrical system being utilized. Nominal Discharge Current (I_n) – All SPDs applied to the distribution system shall have a 20kA I_n rating regardless of their SPD Type (includes Types 1 and 2) or operating voltage. SPDs having an I_n less than 20kA shall be rejected.

1. ANSI/UL 1449 4th Edition Voltage Protection Rating (VPR) – The maximum ANSI/UL 1449 4th Edition VPR for the device shall not exceed the following:

PART 2	Modes	PART 3	208Y/120	PART 4	480Y/277	PART 5	600Y/347
PART 6	L-N; L-G; N-G	PART 7	700	PART 8	1200	PART 9	1500
PART 10	L-L	PART 11	1200	PART 12	2000	PART 13	3000

I. SPD Design

1. Maintenance Free Design – The SPD shall be maintenance free and shall not require any user intervention throughout its life. SPDs containing items such as replaceable single-mode modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.

2. Balanced Suppression Platform – The surge current shall be equally distributed to all MOV components to ensure equal stressing and maximum performance. The surge suppression platform must provide equal impedance paths to each matched MOV. Designs incorporating replaceable SPD modules shall not be accepted.

3. Electrical Noise Filter – Each Type 2 unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be up to 50 dB from 10 kHz to 100 MHz using the MIL-STD-220A insertion loss test method. Products unable able to meet this specification shall not be accepted.

   a. Type 2 units with filtering shall conform to UL 1283 5th Edition.

   b. Type 1 units shall not contain filtering or have a UL 1283 5th Edition Listing.

4. Internal Connections – No plug-in component modules or printed circuit boards shall be used as surge current conductors. All internal components shall be soldered, hardwired with connections utilizing low impedance conductors.

5. Monitoring Diagnostics – Each SPD shall provide the following integral monitoring options:

   a. Protection Status Indicators - Each unit shall have a green / red solid-state indicator light that reports the status of the protection on each phase.

      1. For wye configured units, the indicator lights must report the status of all protection elements and circuitry in the L-N and L-G modes. Wye configured units shall also contain an additional green / red solid-state indicator light that reports the status of the protection elements and circuitry in the N-G mode. SPDs that indicate only the status of the L-N and L-G modes shall not be accepted.

      2. For delta configured units, the indicator lights must report the status of all protection elements and circuitry in the L-G and L-L modes

      3. The absence of a green light and the presence of a red light shall indicate that damage has occurred on the respective phase or mode. All protection status indicators must indicate the actual status of the protection on each phase or mode. If power is removed from any one phase, the indicator lights must continue to indicate the status of the protection on all other phases and protection modes. Diagnostics packages that simply indicate whether power is present on a particular phase shall not be accepted.

6. Thermal MOV Protection

   a. The unit shall contain thermally protected MOVs. These self-protected MOVs shall have a thermal protection element integrated with the MOV and a mechanical disconnect with arc quenching capabilities in order to achieve overcurrent protection of the MOV. The thermal protection assembly shall disconnect the MOV(s) from the system in a fail-safe manner should a condition occur that would cause them to enter a thermal runaway condition.

7. Fully Integrated Component Design – All of the SPD's components and diagnostics shall be contained within one discrete assembly. The use of plug in single-mode modules that must be ganged together in order to achieve higher surge current ratings or other functionality shall not be accepted.

8. Safety Requirements

   a. The SPD shall minimize potential arc flash hazards by containing no single-mode plug in user serviceable / replaceable parts and shall not require periodic maintenance. SPDs containing items such as replaceable single-mode plug in modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.

   b. SPDs designed to interface with the electrical assembly via conductors shall require no user contact with the inside of the unit. Such units shall have any required conductors be factory installed.

9. The minimum surge current capacity of the SPD shall be 250 kA per phase, 125 kA per mode.

10. The SPD shall be connected through a disconnect (30A circuit breaker). The disconnect shall be located in immediate proximity to the SPD. Connection shall be made via bus, conductors, or other connections originating in the SPD and shall be kept as short as possible.

11. The SPD shall be integral to the switchgear as a factory-standardized design.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify surface is ready to accept housekeeping pads and transformer.

C. Review manufacturer's installation instructions.

3.2 INSTALLATION

A. The Contractors shall install all equipment per the manufacturer's recommendations and the contract drawings.

B. All necessary hardware to secure the assembly in place shall be provided by the Contractor.

C. The equipment shall be installed and checked in accordance with the manufacturer's recommendations. This shall include but not limited to:

1. Checking to ensure that the pad location is level to within 0.125 inches per three feet of distance in any direction.

2. Checking to ensure that all bus bars are torqued to the manufacturer's recommendations.

3. Assembling all shipping sections, removing all shipping braces and connecting all shipping split mechanical and electrical connections.

4. Securing assemblies to foundation or floor channels.

5. Measuring and recording Megger readings phase-to-phase, phase-to-ground, and neutral-to-ground (four wire systems only).

6. Inspecting and installing all circuit breakers in their proper compartments.

D. Install panelboards in accordance with NEMA PB 1.1 and NECA 1.

E. Install panelboards in place plumb and square. Install recessed panelboards flush with wall finishes. Install surface-mount type panelboards using spacers to stand enclosure a minimum of 1/8" from wall or mounting surface. Provide supports in accordance with Section 16070.

F. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.

G. Refer to drawings for panelboards with special mounting height requirements.

H. Provide filler plates for unused spaces in panelboards.

I. Provide typed circuit directory for each panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

J. Provide engraved plastic nameplates identifying each panelboard.

K. Wire up equipment and pull and connect wires.

L. Provide spare conduits as identified on the contract drawings. Identify each as SPARE.

M. Ground and bond enclosures according to Section 16060.

3.3 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with appropriate sections of Division 1.

B. Inspect equipment for signs of damage during installation, completion of the interconnecting wiring and grounding, and labeling.

C. Energize equipment and check for phase rotation, reconnect if necessary.

D. Measure steady state load currents at each feeder; rearrange circuits to balance the phase loads to within 20 percent of each other. Confirm panel directory, review and correct if necessary.

3.4 DEMONSTRATION

A. On completion, demonstrate to the Engineer that all equipment has been provided as specified.

END OF SECTION

SECTION 16480

VARIABLE FREQUENCY DRIVES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section includes minimum requirements for the project Variable Frequency Drives (VFD) package to provide power and control for the project proposed 600 HP, 480V, 60Hz, 3-phase water pump induction motors, all as shown on the accompanying contract drawings, appendix F – Pump Station Control Panel Drawings, and as specified herein.

B. The VFD package shall include four (4) VFDs each and the associated Pump Control Panels.

1.2 RELATED SECTIONS

A. The following sections relate to this section Work:

1. Section 01010 – Summary of Work

2. Division 16 – Electrical Specifications

1.3 REFERENCES

A. CONTRACTOR'S work shall comply with the latest requirements of all applicable codes, standards, guides, practices and local regulations pertaining to the job at the time of bidding, and it shall carry approval labels where required. At a minimum, the project VFD drive packages shall be designed, manufactured, tested and installed in accordance with the following latest document issues:

1. IEEE 519 - Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems.

2. NEMA - Enclosures for Electrical Equipment

3. NEMA ICS 7 – Industrial Control and Systems: Adjustable-Speed Drives

4. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable-Speed Drive Systems

5. UL 508 - Industrial Control Equipment

6. UL 508A – Industrial Control Panels

7. UL 508C - Power Conversion Equipment

8. ANSI/NFPA 70 – National Electrical Code, Article 409

9. ANSI/IEEE C2 – National Electrical Safety Code

10. OSHA CER 1910, Subpart S – Electrical General, Parts 1 & 2

1.4 SUBMITTALS FOR REVIEW

A. CONTRACTOR shall submit before construction, for approval, the following drive-related documents:

1. Complete outline and arrangement drawings showing front layout, top and floor plans, dimensions, and field wiring conduit areas; weights and lifting diagram; device legends, descriptions and installation notes.

2. Bill of materials of the complete drive package.

3. Specifications and technical descriptions of all package components.

4. Complete schematic diagram showing all drive package components.

5. Complete wiring connection drawing showing physical location of all drive components and devices, all internal wiring and wiring tagging, and all external wiring termination points, including PLC I/O.

6. Drive package and components identification nameplate list.

7. Drive package information data and component nameplates. This shall include short-circuit rating.

8. Painting specification.

9. Certified factory test report.

1.5 SUBMITTALS FOR CLOSEOUT

A. On completion, CONTRACTOR shall submit, for closeout, the following drive-related documents:

1. All as-built documents specified above under the “Submittals for Review” heading.

2. A copy of the drive package programming documentation.

3. A recommended spare parts list with prices and deliveries.

4. On-Site installation and startup report.

5. A complete copy of the drive package Installation, Operation and Maintenance Manual.

1.6 QUALITY ASSURANCE

A. The drive manufacturer shall be ISO 9001 certified facility and it shall have an industry-accepted and well-documented Quality Assurance (QA) program. At a minimum, the QA program shall include material, design, fabrication, inspection and test requirements and procedures. The manufacturer’s QA program shall be available to ENGINEER upon request.

B. The VFDs and the Pump Control Panel specified shall be furnished by the VFD manufacturer as a package, to assure a properly coordinated system. The VFD package shall not be fabricated in whole or part by parties other than the VFD manufacturer. Third party distributor or packager modifications to a standard product will not be allowed.

1.7 EQUIPMENT MANUFACTURER

A. The drive package manufacturer shall be Schneider Electric Altivar 660.

B. The equipment manufacturer shall have 24-hour service facilities within 100 miles of the Project Site.

C. CONTRACTOR shall fill out original equipment warranty forms in OWNER'S name and register with the manufacturer.

PART 2 PRODUCTS

2.1 DESCRIPTION

A. The drives shall be UL 508 listed and serialized, completely factory-assembled, fully integrated Scheider Electric, or approved equal, adjustable speed drive (ASD) packages.

B. The drive packages shall be sized for continuous variable torque operation for 700HP, 480VAC, 3-phase, 60Hz pump induction motors. The drive packages must also be operable with the to-be-installed 600HP, 480VAC, 60Hz pump motors. The motors shall be located remotely from the drives as indicated on the Contract Drawings.

C. The drive packages shall be designed for continuously rated operation in the indoors, non-hazardous, municipal water pump station environment (i.e., damp, humid, air born dust environment) at temperature range 0 degrees C to 40 degrees C, and relative humidity 100 percent. The drive manufacturer shall supply and install HVAC equipment as required in the drive enclosure to maintain the internal conditions acceptable by the drive package components. The drive enclosure ventilation openings, if any, shall be equipped with filtration to prevent intrusion of dust, and rodents.

D. The drives are connected to an emergency power generator. As such, the drives shall be capable of full operation both starting and running with a maximum 15 percent voltage dip based on a 480VAC system.

E. The drive packages shall meet all harmonic distortion requirements as outlined in IEEE 519 for each drive at the point of common coupling. CONTRACTOR shall demonstrate meeting these requirements with actual measurements after completion of the site drive packages installation. CONTRACTOR shall coordinate with the local electrical utility and obtain approval of the completed design. Submit a copy of the utility approval to ENGINEER prior to completion of the drive installation.

F. The drives shall be 6-pulse SCR bridge rectifier design complete with pulse width modulation (PWM) gated bipolar transistors (IGBT) inverter. All drives shall be equipped with microprocessor-based controls to convert 480VAC, 60Hz, 3-phase input to a variable voltage and frequency output for adjustable speed control of the 460VAC, 60Hz, 3-phase squirrel cage induction motors.

G. The drives shall be rated as follows:

1. Input:

a. Voltage: 3-phase, 480VAC plus or minus 10 percent, plus or minus 0.5 percent voltage unbalance.

b. Frequency: 60Hz plus or minus 2 percent.

c. Power loss ride-through up to 0.5 seconds.

d. Power Factor: minimum 0.95 percent displacement power factor at maximum load and speed.

e. Efficiency: minimum 97 percent at maximum load and speed.

2. Output:

a. Motor HP-based (700HP minimum rating).

b. Voltage: 3-phase, 480VAC.

c. Current: 110 percent continuous, 150 percent for 1 minute.

d. Frequency: 0-400Hz (60Hz base frequency).

e. Carrier Frequency: selectable at 2, 4 and 6kHz.

f. Starting Torque: up to 150 percent (rated torque at 0.5Hz).

H. At a minimum, the drives shall be provided with the following protective features:

1. The drive and the bypass starter input circuit disconnects. The circuit disconnects shall be 100 percent rated, lockable, molded case thermal-magnetic circuit breakers.

2. Incoming line current-limiting fuses.

3. Input/output power surge protection.

4. Input phase loss and overvoltage protection.

5. Drive thermal protection.

6. DC overvoltage protection.

7. Drive overload protection.

8. Output phase loss, short circuit and ground fault protection.

9. Motor overload (I and I^2) protection.

10. Output TCI dv/dt filters if required based on the motor distances given herein.

I. At a minimum, the drives shall be provided with the following control features:

1. Sensorless vector control.

2. Variable torque V/Hz adjustable characteristic.

3. Selectable accelerating/decelerating characteristics.

4. Programmable run patterns.

5. Adjustable speed range: 0 percent to 110 percent.

6. Soft start at zero Hz and linearly increasing to set speed.

7. Soft stall.

8. Selectable stop modes including coast, dynamic and DC injection breaking.

9. Capable of running without motor connected.

10. Capable of starting into a spinning load.

11. Capable of accepting the load (motor) disconnection while running.

J. At a minimum, the drives shall be provided with the following control functions:

1. Provision of the enclosure door-mounted operator interface consisting of an LED display and a digital operator keypad. The keypad shall allow the drive programming monitoring of operation parameters, fault history, and the drive diagnostics and troubleshooting.

2. Frequently accessed VFD programmable parameters shall be adjustable from the drive keypad. The drive operator shall be able to scroll through the keypad menu to choose, at a minimum, between the following local on-line status and actual value information data:

a. Monitor.

b. Operate.

c. Parameter setup.

d. Actual parameter values.

e. Active faults.

f. Fault history.

g. LCD contrast adjustment.

h. Information to indicate the standard software and optional features software loaded.

3. At a minimum, the keypad shall be capable of displaying the following monitoring functions data:

a. Output frequency.

b. Output speed.

c. Motor current.

d. Motor torque.

e. Motor power.

f. Motor voltage.

g. DC-link voltage.

h. Heat-sink temperature.

i. Total operating days counter.

j. Operating hours (resettable).

k. Total megawatt hours.

l. Digital inputs status.

m. Digital and relay outputs status.

K. At a minimum, each drive package shall include the following components and those as shown in Appendix F – Pump Station Control Panel Drawings.

1. Schneider Electric Altivar adjustable speed drive. The drive shall be equipped with a door-mounted HMI feature (keypad and LCD display) to allow for the drive programming, operation monitoring, fault diagnostic and troubleshooting.

2. Local PLC, Schneider Electric Modicon PLC as shown in Appendix F – Pump Station Control Panel Drawings.

3. Analog Temperature Inputs, Schneider Electric Modicon TM3 as shown in Appendix F – Pump Station Control Panel Drawings.

4. Ethernet Switch, Phoenix Contact as shown in Appendix F – Pump Station Control Panel Drawings.

5. Door mounted Ethernet based HMI, Proface based unit as shown in Appendix F – Pump Station Control Panel Drawings.

6. Associated terminal blocks, fusing, relays, and cooling devices for a complete and total system as shown in Appendix F – Pump Station Control Panel Drawings.

7. Provision of control power transformers (CPTs). The CPTs shall provide 120VAC power to the drive package controls, PLC, HMI, and the like.

8. "E-Stop" mushroom head push-pull with guard.

9. All required and necessary control and protective devices including any digital and analog I/O to allow for control and monitoring as shown on the contract drawings, Appendix F – Pump Station Control Panel Drawings, and as specified herein.

10. Interconnecting wiring.

11. NEMA 1 enclosure.

2.2 TOOLS, SPARE PARTS AND MAINTENANCE MATERIALS

A. Each VFD shall be furnished with all special tools, parts, and equipment as suggested by the equipment manufacturer to complete operation and maintenance of the unit.

PART 3 EXECUTION

3.1 DESIGN AND FABRICATION

A. The drive packages shall be designed and fabricated in accordance with this section reference documents, and in compliance with the manufacturer's QA program.

3.2 FACTORY TESTING

A. Provide a complete package factory standard testing as per NEMA ICS 7, Adjustable-Speed Drives and manufacturer's QA program.

B. Upon completion of the tests, and prior to shipment, certified copies of all factory test reports should be submitted to ENGINEER for review and approval.

3.3 SHIPMENT AND DELIVERY

A. Shipment:

1. Each individual drive package shall be delivered complete in one shipment. The entire package shall be shipped completely assembled, weather protected for shipment, and mounted on the shipping skid.

2. All heavy items, that cannot be safely shipped installed in the enclosure, shall be separately crated. All separately crated items shall be match-marked to facilitate assembly in the field.

3. The shipment items shall be individually weather protected, even if all items are shipped together in an outdoor environment protected container. All shipment items shall be suitably braced and packed for shipping to prevent breakage or distortion while in transit.

4. One set of the drive as-built documentation and installation manual shall be placed inside of the shipment container.

B. Delivery: On delivery, inspect the drive package for signs of damage and loose connections.

C. Rigging:

1. Provide manufacturer–recommended rigging equipment and qualified operators.

2. Handle the drive carefully to avoid damage to the package components and finish.

3. Lift only at points provided for the purpose.

D. Storage:

1. Store the drive in its final location or in safe and dry designated storage area.

2. Maintain factory wrapping or provide additional heavy canvas or heavy plastic cover to protect equipment from construction environment, dirt, water, and other construction debris.

3. Barricade drive locations to prevent possible damage by construction activities and/or traffic.

3.4 INSTALLATION

A. CONTRACTOR shall provide concrete pads for the drive packages.

B. Each drive package shall be securely set in place, as shown on the Drawings and in accordance with the manufacturer's instructions.

C. Assemble the drive loose components, if shipped separately.

D. Install all drive associated interconnecting wiring and grounding as specified in Division 16 specifications.

E. After drive packages installation has been completed, provide the drive installation inspection, energization, parameters setting and startup by the drive manufacturer representative. This shall include Harmonic Distortion Acceptance test, which shall be a field voltage and current harmonic measurement with the approved instrument. This task shall be in close communication with OWNER, and it shall be witnessed by the ENGINEER. The on-Site drive inspection and certified test report shall be provided as a part of Record Documents.

F. CONTRACTOR shall be responsible for the training of the OWNER'S personnel assigned to operate and maintain the drive packages. Preparation for the training activities shall start at the beginning of the Project, in liaison with OWNER. CONTRACTOR shall develop the OWNER-approved training plan and schedule. The actual training shall begin during the final stages of the equipment installation work and prior to the equipment acceptance inspection and start-up. At a minimum, the training activities shall include the following:

1. Review the drive package O&M manual including the drive system description, operation, maintenance, troubleshooting, and health and safety issues.

2. Review and practice of the drive package recommended operation.

3.5 FIELD QUALITY CONTROL

A. On completion, demonstrate to ENGINEER that the drives supply and installation, and all as-built documentation, has been provided as specified.

END OF SECTION

SECTION 16510

LIGHTING

PART 1 GENERAL

1.1 WORK INCLUDED

A. Provide complete installation, including luminaires, standards, hangers, supports, fittings, lamps, wiring, connections, and controls, as indicated in the Contract Documents. Types of luminaires in this project include LED.

1.2 DESCRIPTION OF THE WORK

A. This section includes minimum requirements for the following:

1. LED assemblies.
2. LED drivers.
3. Diffusers.

1.3 SUBMITTALS

A. Submit shop drawings as described in the Special Conditions of these Contract Documents. Luminaire shop drawings shall include photometric data for each luminaire utilizing the specified lens/louver type, lamp(s) and ballast(s). All luminaire types shall be submitted in a single complete brochure, which shall be in the form of a soft cover binder with each luminaire separated by an identified index tab. Information on each luminaire shall include:

1. Manufacturer and Catalog Number.
2. Dimensioned Construction Drawing(s).
3. Standard Catalog "Cut" Sheet.
4. Photometries.
5. Lens/Louver Type.
6. Driver Type and Rating.
7. LED connectors.
8. Maintenance Data.

1.4 QUALITY ASSURANCE

A. Luminaires shall be standard products of manufacturers regularly engaged in the manufacture of the specific type of luminaires specified, and shall be the manufacturer's latest standard design that complies with specification requirements. Firms installing the luminaires shall have a minimum of five (5) years of successful installation experience on projects with interior lighting work similar to the requirements of this project.

B. Codes and Standards

1. NEC: Shall comply with Articles 220, 410 and 510 as applicable to installation and construction.

2. NEMA: Shall comply with Standard Publication Nos. LE 1 and LE 2 as applicable to lighting equipment.

3. UL: All interior lighting luminaires and components shall be UL listed and labeled. Comply with all applicable UL standards including UL 486A and B.

4. CBM: Fluorescent ballasts shall comply with Certified Ballast Manufacturers Association standards and carry the CBM label.

5. All work shall comply with applicable local code requirements of the authority having jurisdiction.

C. Verify the availability of all luminaires proposed to be used in the execution of the work prior to submitting for approval. The discontinuance of production of any luminaire after such approval has been granted shall not relieve the Contractor from furnishing an approved luminaire of comparable quality and design at no additional cost.

D. Luminaires shall be as specified in the "Luminaire Schedule." Luminaire types, characteristics, photometries, finishes, etc., correspond to the first manufacturer, and associated catalog number, listed in the "Luminaire Schedule." Provide a sample luminaire from the factory for any products not listed as acceptable for approval. The Owner's Representative reserves the right to disapprove any luminaire type submitted which is not equal in quality, appearance, or performance to the luminaire specified.

E. All luminaires shall meet the Total Luminaire Efficiency (TLE) requirements of the New York State Energy Conservation Construction Code.

PART 2 PRODUCTS

2.2 LED LUMINAIRES

A. General:

1. Manufacturers shall be registered with the Department of Energy (DOE) as a Quality Advocate and shall have taken the pledge to be listed on the LED lighting facts website.

2. Luminaire measurements have been standardized and are in compliance with IESNA Standard LM-79 test procedure.

3. LED's have been standardized and are in compliance with IESNA Standard LM-80 and demonstrate L70 life after 50,000 hours.

4. Luminaires and/or replacement lamps shall be either Energy Star certified or Design Lights Consortium listed where noted on the luminaire schedule to qualify for NYSERDA or Utility provider rebate incentives. Submitted luminaires not currently on the DLC qualified products list (http://www.desi gnlights.org/) will be rejected.

5. Manufacturers shall prove color consistency across all LED's via 4 step MacAdam Ellipse.

6. Luminaires shall be tested at an ambient temperature of +25 degrees for a minimum of 6,000 hours.

7. Maximum junction temperature of 80 deg. C.

8. Minimum drive current of 350 mA. Maximum drive current of 700 mA.

9. Luminaires shall have a minimum 5-year warranty.

10. Refer to Luminaire Schedule on drawings for complete Luminaire makes and models.

2.3 LED REPLACEMENT LAMPS

A. Type A-19 replacement lamp shall have the following characteristics:

Wattage	Initial lumens	Efficacy (lm/W)	Color Temperature	CRI	Avg. Rated Life (hours)	Equivalent Incandescent Wattage
9	450	50	3,000	82	25,000	40
13	800	62	3,000	82	25,000	60
27	1,600	59	3,000	80	25,000	100

B. Type BR30 replacement lamp shall have the following characteristics:

Wattage	Initial lumens	Efficacy (lm/W)	Color Temperature	CRI	Avg. Rated Life (hours)	Equivalent Incandescent Wattage
12	750	63	3,000	83	50,000	65

C. Type CA11 replacement candelabra lamp with E12 base shall have the following characteristics:

Wattage	Initial lumens	Efficacy (lm/W)	Color Temperature	CRI	Avg. Rated Life (hours)	Equivalent Incandescent Wattage
1.8	75	42	3,000	80	15,000	10

D. Type CA11 replacement candelabra lamp with E26 medium screw base shall have the following characteristics:

Wattage	Initial lumens	Efficacy (lm/W)	Color Temperature	CRI	Avg. Rated Life (hours)	Equivalent Incandescent Wattage
2.2	90	41	3,000	80	15,000	15

E. Type MR16 2-Pin GU5.3 base replacement lamp shall have the following characteristics for use on 12 Volt system:

Wattage	Beam Spread (degrees)	Initial Lumens	Efficacy	Color Temperature	CRI	Avg. Rated Life (hours)	Equivalent Incandescent Wattage
4	25	240	60	2,700	82	25,000	20
4	35	240	60	2,700	80	25,000	20
7	25	460	55	3,000	80	25,000	50
7	35	460	66	3,000	80	25,000	50

F. Type PAR 38 replacement flood lamp E26 medium screw base shall have the following characteristics:

Wattage	Beam Spread (degrees)	Initial Lumens	Efficacy	Color Temperature	CRI	Avg. Rated Life (hours)	Equivalent Incandescent Wattage
12	12	660	55	2,700	82	25,000	40
12	25	660	55	2,700	82	25,000	40
12	35	660	55	2,700	82	25,000	40

Wattage	Beam Spread (degrees)	Initial Lumens	Efficacy	Color Temperature	CRI	Avg. Rated Life (hours)	Equivalent Incandescent Wattage
18	12	1,000	56	3,000	90	50,000	60
18	25	1,000	56	3,000	90	50,000	60
18	40	1,000	56	3,000	90	50,000	60

Wattage	Beam Spread (degrees)	Initial Lumens	Efficacy	Color Temperature	CRI	Avg. Rated Life (hours)	Equivalent Incandescent Wattage
26	12	1,500	58	3,000	82	50,000	100
26	25	1,500	58	3,000	82	50,000	100
26	40	1,500	58	3,000	82	50,000	100

G. Acceptable Replacement Lamp Manufacturers

1. General Electric.
2. Philips.
3. Sylvania/Osram.

2.4 LED DRIVERS

A. Driver:

1. Driver shall be of the constant current type.
   a. Voltage: 120/277, as noted on Contract Drawings.
   b. Driver Current: 350mA- 700mA.
   c. Maximum THO: 10%.
   d. Minimum Power Factor: 0.9.

2. Acceptable Manufacturers.
   a. Philips Advance – Xitanium.
   b. Lutron Hi-Lume.
   c. Sylvania/Osram – Optotronic.

B. Dimmable Driver (0-10v)

1. Driver shall be of the constant current type.
   a. Voltage: 120/277, as noted on Contract Drawings.

b. Driver Current: 350mA- 700mA.
c. 0-10v dimming capable down to 10%.
d. Maximum THO: 10%.
e. Minimum Power Factor: 0.9.

2. Acceptable Manufacturers.
a. Philips Advance – Xitanium.
b. Lutron - Hi-Lume A series.
c. Osram/Sylvania – Optotronic.

2.5 DIFFUSERS

A. Lenses:

1. Extruded 100 percent virgin acrylic material with a minimum weight of ten ounces per square foot.

2. Type 12- Clear material with 0.125 inch overall thickness with .080 Inch penetration comprised of 3/16 inch square based female cones aligned 45 degrees to the length and width of the panel.

3. Type 19- Clear material with 0.156 inch overall thickness with 0.080 inch penetration comprised of 3/16 inch square based male cones aligned parallel and perpendicular to the length and width of the panel.

4. White matte - White material with 0.125 inch overall thickness.

5. White overlay - White material with 0.040 inch overall thickness.

6. The maximum deflection at the center of a 2-foot x 4-foot lens shall be no greater than 0.250 inch. Arched or warped lenses will not be accepted.

2.6 LUMINAIRE SCHEDULE

A. Luminaire schedule is found on the Contract Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which luminaires are to be installed and the substrate for supporting luminaires. Notify the ENGINEER in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 COORDINATION

A. Refer to respective reflected ceiling plan for each area. Reflected ceiling plans indicate proper luminaire location only. Coordinate the proper arrangement with all other ceiling mounted devices. Contract Documents indicate luminaire characteristics (type), quality, quantity, etc. Verify with the ceiling supplier design of actual ceiling installed in each area and coordinate compatible luminaire flange.

B. General

1. Install interior luminaires at locations and heights as indicated, in accordance with luminaire manufacturer's written instructions, applicable requirements of NEC, NECA's 'Standard of Installation," NEMA standards, and with recognized industry practices.

2. Provide luminaires and/or luminaire outlet boxes with hangers to properly support luminaire weight. Submit design of hangers, method of fastening, other than indicated or specified herein, for review by ENGINEER.

3. Make installation such that the luminaire is free of finger marks, flaws, scratches, dents, or other imperfections.

4. Arrangement:

a. Align edges of luminaires with walls or other building elements. Where indicated by dimensions or indicated on Drawings, maintain indicated arrangement.

b. For wall-to-wall installed luminaires, field measure length required after completion of the wall construction and prior to ordering the luminaires. Fabricate in largest lengths allowable.

c. Recessed Mounting

i. Verify ceiling construction and material prior to ordering luminaires.

ii. Provide plaster frames for plaster ceilings and flanged frames for drywall ceiling.

iii. Provide necessary mounting hardware and accessories to adapt luminaire to ceiling construction.

iv. Provide gaskets, trims, flanges, etc. as required to prevent light leaks around trim.

v. Where installing 'lay-in' type luminaires, each Luminaire shall be supported completely independent of the ceiling system by way of 12-AWG galvanized steel support wires.

vi. Support wires shall be attached from all four corners of the Luminaire housing to the building structure. Each support shall be capable of supporting 100 pounds.

vii. Provide saddle hangers or tie bars attached to runners or between crossbars of ceiling systems as a safety measure.

viii. Provide mounting splines or other positive means of maintaining alignment and rigidity.

d. Stem Mounting

i. Use self-aligning hangers in canopies for hanging luminaires true to vertical. Do not deface ceiling or walls. Locate hangers at intersections of joints or at centers of blocks in rooms with patterned type ceiling materials such as acoustic tile. Use hangers capable of supporting four times luminaire weight.

ii. Align continuous rows of luminaires maintaining luminaires level without rotation about the longitudinal axis.

iii. Rigidly support outlet box independent of ceiling system from building structure. Where obstructions prevent direct support of outlet, provide offset or trapeze hangers of outlet box.

iv. Stem shall be supported directly from building structure on centers as called for by the manufacturer. There shall be a minimum of two stems per individual 4-foot luminaire, and 3 stems per individual 8-foot luminaire for steel luminaires.

v. Extruded aluminum luminaires shall have hangers as called for by the manufacturer.

vi. Provide brackets from the manufacturer of the same finish and material as the luminaires to present a seamless continuous row mounting appearance. Provide continuous row mounting brackets between all adjoining luminaires.

e. Surface Ceiling Mounting

i. Mount surface luminaires tight to surface without distorting surface.

ii. Space luminaires in continuous rows to correspond to ceiling joint intersections. Continuous row luminaires may be fed by a single outlet where luminaires contain approved wireways and suitable wiring is used.

iii. Provide hangers for each luminaire, each rated to support four times the luminaire weight. Provide offset or trapeze hangers where required. Supports shall be provided on a maximum of 4-foot centers with a minimum of two hangers per individual 4-foot luminaire and three hangers per individual 8-foot luminaire. Hangers shall be supported from the building structure and independently from ceiling system or other building services.

iv. Fasten luminaires securely to structural supports.

3.3 LAMPS

A. Provide lamps in all luminaires.

B. Replace any lamp whose color is determined to be unsatisfactory. Replace all lamps, which are found to have failed during the 12-month warranty period.

C. All lamps shall be new and unused. If permanent lighting system is used for temporary construction lighting, lamps shall be replaced upon turn over to OWNER.

D. Furnish stock or replacement lamps amounting to 15%, but not less than 4 lamps in each case, of each type and size lamp used in each type luminaire. Deliver replacement stock as directed to OWNER's storage space.

3.4 DELIVERY, STORAGE, AND HANDLING

A. Luminaires and equipment shall be delivered with UL and manufacturer's labels intact and legible in factory fabricated containers.

B. Luminaires and accessories shall be stored in protected dry locations in their original unbroken package or container. Luminaires shall be protected from dust and dampness both before and after installation. Luminaires shall be protected from paint and cleaning solvents during all phases of construction.

C. Handle interior lighting luminaires carefully to prevent damage, breaking, and scoring of finishes. Do not install damaged luminaires or components; replace with new.

3.5 SEQUENCING AND SCHEDULING

A. Coordinate with other work including ceiling type, wires/cables, electrical boxes, fittings, and raceways, to properly interface installation of interior luminaires with other trades.

3.6 REMOVAL OF EXISTING LUMINAIRES

A. Remove existing luminaires where indicated and dispose of off-site in accordance with all EPA regulations at Contractor's expense.

B. If ballasts have leaked, remove material deposited in luminaire. Assume material was PCB contamination, or test samples to show that material is not PCB and submit a report. Dispose of material -s required by EPA, including clean-up materials used. Dispose of ballast, which do not have non-PCB label in PCB containers, and have containers taken to EPA approved incinerators. Follow all EPA regulations for transporting material.

C. Assume ballast contain PCB materials unless labeled otherwise or test samples to show materials are not PCB; submit test report. Remove all ballast from existing luminaires indicated on contract documents. Dispose of all ballast, which do not have non-PCB labels in PCB containers and pay all costs to have containers taken to EPA approved incinerators and disposed of per all EPA regulations. Follow all EPA regulations for transporting containers and materials. If ballast has leaked in existing luminaire, remove material deposited in luminaire and dispose of those materials as listed above. Provide Certificate of Disposal and all associated paperwork to Owners representative.

D. Assume all fluorescent lamps contain Mercury materials unless labeled otherwise or test samples to show materials do not contain Mercury and submit test report. Remove all lamps from existing luminaires indicated on contract documents. Dispose of all lamps, which do not have non-Mercury labels in compliance with the requirements of the New York State Department of Environmental Conservation and all applicable Federal Laws. Follow all regulations for transporting materials. Provide Certificate of Disposal and all associated paperwork to Owners representative.

3.7 FINAL CLEANING

A. Prior to acceptance, damp clean diffusers, glassware, trim, reflectors, lamps, louvers, lens and similar objects of all luminaires. Remove all dirt, corrosion, foreign material, finger marks, and blemishes. Replace all burned out lamps and failed components.

END OF SECTION

Appendix A
Women and Minority Business Enterprise Policy

APPENDIX A

WOMEN AND MINORITY BUSINESS ENTERPRISE POLICY

ERIE COUNTY WATER AUTHORITY

APPENDIX A

WOMEN AND MINORITY BUSINESS ENTERPRISE POLICY

ERIE COUNTY WATER AUTHORITY

It is the policy of the Authority to foster and encourage minority business enterprise participation in the construction contracts of the Authority. Through the setting of Minority Business Enterprise goals and careful monitoring of CONTRACTOR compliance, the Authority will ensure the fullest possible participation in construction activities by qualified minority and women-owned firms.

Some of the federal and state laws that provide the basis for Equal Employment Opportunity and Affirmative Action are:

1. Title VII, Civil Rights Act of 1964 (as amended by the Equal employment Opportunity Act of 1972): Prohibits employment discrimination because of race, color, sex, religion or national origin.

2. Executive Order 11246 (as amended by the Executive Order 11375): Requires Affirmative Action by all Federal CONTRACTORS and subcontractors and requires that all firms with Contracts over $50,000.00 and 50 or more employees develop and implement written programs.

3. Equal Act of 1963: Requires employers to provide equal pay for men and women performing similar work.

4. New York State Human Rights Law: Prohibits discrimination based on race, color, sex, age, creed, disability, national origin and marital status in employment matters.

5. Flynn Act: Guarantees disabled citizens protection against discrimination in housing, employment, public accommodations, training programs and non-sectarian education due to mental, physical or medical disability.

6. Title VI, Civil Rights Act of 1964: Prohibits discrimination based on race, color or national origin in all programs which receive Federal aid.

7. Title IX, Education Amendments Act of 1972: Prohibits sex discrimination against students of any educational institution receiving Federal financial aid.

A. **MINORITY BUSINESS UTILIZATION COMMITMENT**

The Erie County Water Authority has established the following business utilization rules which requires all prime CONTRACTORS awarded construction contracts let by the Erie County Water Authority to exemplify Affirmative Action to sub-contract to minority business enterprise (MBE). For the purpose of these regulations, the term “Minority Business Enterprise” refers to a business at least fifty-one percent (51%) of which is owned and controlled by minority group members. Minority group members are citizens of the United States who are Women, Blacks, Hispanics and Native Americans. MBE’s must demonstrate current certification of a government agency.

The Authority has determined that a goal of ten percent (10%) of the total contract value represents a fair share of minority business utilization on each construction contract awarded.

Recipients of Authority construction Contracts must utilize minority-owned business sources for supplies, services and professional services, allowing these sources the maximum feasible opportunity to compete for Contracts, Subcontracts and third-tier Contracts to be performed, All prime CONTRACTORS awarded Authority Contracts estimated to exceed $100,000.00 must take positive steps to "afford fair opportunities to MBE's". Positive steps shall include, but not be limited to, (a) utilizing a source list of bona fide minority business enterprises, (b) solicitations of bids from MBE's particularly of those located in Erie County, (c) giving minority firms sufficient time to submit proposals in response to solicitations and (d) maintaining records showing minority business enterprises and specific efforts to identify and award Contracts to these Companies.

Each CONTRACTOR bidding on an Erie County Water Authority contract is to contact MBE's and solicit bids for various aspects of each project. The CONTRACTOR is to supply the Authority with information regarding contracts for services and products with minority business enterprises and the dollar amount of each contract on the Minority Business Utilization Report.

The Successful Bidder shall submit to the Authority the Minority Business Enterprise Utilization Report - Part A within one week of the bid opening. Part A includes a list of MBE's from whom the CONTRACTOR has solicited bids, or with whom the CONTRACTOR has signed a binding contractual agreement. The Authority will not consider a CONTRACTOR's bid where the CONTRACTOR fails to submit this report or where an examination of the report evidences failure by the CONTRACTOR to comply with the affirmative action requirements of the Contract.

In the event of a joint venture participating in this MBE Program, the Joint Venture Disclosure Affidavit must be submitted with Part A by all parties involved. Only to the extent that a minority business enterprise contributes to and is paid for its participation in a joint venture will that dollar be credited towards the 10% goal of minority participation in the Erie Country Water Authority MBE Program.

MBE's must be approved by the Erie County Water Authority before their participation may be credited toward the 10% goal. Where the proposed MBE is not approved by the Authority, an Authority MBE/Disclosure Affidavit must be filed with the Contract Compliance office. Forms and lists of certified MBE's can be obtained by calling Lavonya Lester, Director of Equal Employment Opportunity (ECWA) at (716) 685-8223.

A Minority Business Enterprise Utilization Waiver Request may be completed and submitted with the Minority Business Enterprise Utilization Report - Part A to the Authority within one week of the bid opening. Waivers shall be granted only where the availability of MBE's in the market area of the project is less than the 10% goal.

Sufficient information must be provided on the Minority Business Enterprise Utilization Waiver Request to ascertain whether a waiver should be approved, conditionally approved or rejected by advice of the Equal Opportunity Office.

A waiver approval limits the CONTRACTOR's obligation to solicit MBE's for this particular project. It does not relieve the CONTRACTOR of MBE utilization for any other Erie County Water Authority project on which he submits a bid.

Conditional approval of the waiver request makes it necessary for the CONTRACTOR to continue soliciting MBE's for contracting purposes, after he has been declared the low bidder.

A MBE Utilization Waiver Request will be rejected if the CONTRACTOR:

1. fails to provide information on the Minority Business Enterprise Utilization Report with his bid.

2. provides fraudulent information of the MBE reports.

3. fails to make an honest good faith effort to recruit and contract with MBE's or

4. takes any other action which is contrary to the spirit and intent of the law.

THE INFORMATION PROVIDED ON THE MBE WAIVER REQUEST AND THE MBE UTILIZATION REPORT WILL BE CONSIDERED CONCURRENTLY TO DETERMINE IF A WAIVER SHOULD BE APPROVED, CONDITIONALLY APPROVED OR REJECTED.

The low bidder shall submit to the Authority, within one week of the bid opening, a schedule for minority business enterprise participation, with whom the CONTRACTOR intends to Subcontract, specifying the agreed price to be paid for such work, and identifying in detail the Contract item(s) or parts to be performed by each minority business enterprise. A letter of intent to enter into a Subcontract or purchase agreement, signed by the minority business, contingent upon the contract award, indicating the agreed upon price and scope of work, shall be provided, signed by both the CONTRACTOR and the minority business enterprise. The prime CONTRACTOR shall not substitute or delete the listed minority business enterprise without the written consent of the Erie County Water Authority.

In the event that the MBE goal for the contract is not met, the CONTRACTOR shall provide sufficient documentation to establish that every positive effort was made to identify, solicit and negotiate with MBE's in pursuit of the goal. Such documentation includes, but is not limited to, advertisement in minority-focused media, written contract with minority businesses indicating sufficient bidder's price along with evidence showing the work to be performed is the same, and not a reduced portion thereof.

The CONTRACTOR shall provide to the Erie County Water Authority copies of all subcontracts and/or purchase agreements with minority business enterprises within one week of the bid opening. A notice to proceed with construction shall not be issued until acceptable documentation is received.

When the project is thirty (30%) percent complete, the CONTRACTOR shall submit to the Authority the Minority Business Enterprise Utilization Report - Part B. Part B lists the MBE's on the project, the dollar amounts paid to that date and the estimated amount remaining to be spent.

The Minority Business Enterprise Utilization Report - Part C certifies the actual dollar amount expended to MBE's. Part C must be completed by the prime CONTRACTOR and submitted at the seventy-five (75%) percent payment level.

The Minority Business Enterprise Utilization Report - Part D certifies the total dollar amount expended to MBE's. Part D is to be submitted with the request for final payment.

In the event a CONTRACTOR fails to comply with these provisions the Authority may:

1. Summon the CONTRACTOR to a hearing

2. Withhold progress payments in part or in full

3. Cancel the contract.

4. Bar award of future Contracts until the CONTRACTOR can demonstrate that he will comply.

It is hereby the Erie County Water Authority's commitment to assure that on all contracts awarded, prime CONTRACTORS expend a fair share of the contract with bona fide minority businesses in accordance with the goals set forth by the Authority. Failure to comply with these provisions shall disqualify the bidder and shall constitute a breach of contract subject to all remedies available to the Authority.

The Prime CONTRACTOR and all minority Subcontractors are bound by all requirements as put forth in the Erie County Water Authority standard General Conditions and all modifications thereto contained in these Contract Specifications.

Listing of **AFFIRMATIVE ACTION FORMS ATTACHED:**

ERIE COUNTY WATER AUTHORITY
MINORITY BUSINESS ENTERPRISE
UTILIZATION REPORT - PART A

This information must be submitted by the successful bidder within one week of bid opening.

COMPANY _____

AUTHORIZED REPRESENTATIVE _____

ADDRESS _____

TELEPHONE NUMBER _____

PROJECT NAME _____

PROJECT NUMBER _____

I. List actions taken to identify, solicit, and contact Minority Business Enterprises (MBE) to bid on subcontracts on this project.
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

II. List all bona fide Minority Business Enterprise, subcontractors, professional personnel, solicited, contracted, or presently negotiating a contract in accordance with the minority business utilization goal set forth by the Erie County Water Authority. (Attach additional sheets if necessary.)

MINORITY OWNED FIRM	SUPPLY/ SERVICE	AMOUNT OF PROPOSAL	PRIOR CERTI-FICATION	CONTRACT EXECUTED	REASON NOT AWARDED
NAME:_____ ADDRESS:_____ TELE NO._____ IRS NO._____				YES _____ NO _____	
NAME:_____ ADDRESS:_____ TELE NO._____ IRS NO._____				YES _____ NO _____	
NAME:_____ ADDRESS:_____ TELE NO._____ IRS NO._____				YES _____ NO _____	
NAME:_____ ADDRESS:_____ TELE NO._____ IRS NO._____				YES _____ NO _____	

PART A CONTINUED

III. Assistance offered by CONTRACTOR to MBE's as to bonding, union requirements, obtaining work capital etc...

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

IV. Total Dollar Amount to be subcontracted to Minority Business Enterprise(s): $ _____

V. Total Amount of Bid: $ _____

VI. MBE Percent (%) of project bid: _____

VII. YOU MUST ATTACH COPIES OF RELEVANT CORRESPONDENCE AND DOCUMENTS INCLUDING RETURN RECEIPTS.

_____ DATE

_____ SIGNATURE OF AUTHORIZED REPRESENTATIVE

Note: Within one week of the bid opening, this original form, together with a letter of intent to enter into a subcontract or purchase agreement, contingent upon the contract award, indicating the agreed upon price and scope of work, signed by both the CONTRACTOR and the Minority Business Enterprise, must be submitted to:

Lavonya Lester, Director of Equal Employment Opportunity (ECWA)
Erie County Water Authority
3030 Union Road
Cheektowaga, New York 14227

WAIVER

COMPANY _____

ADDRESS _____

TELEPHONE NUMBER _____
(AREA CODE) (NUMBER)

1. CONTRACTOR has made a good faith effort to adopt subcontracting on this project to those trades, professions, supplies, etc. for which minority business enterprises bids could be solicited; and

2. The total percentage of the bids which could be Subcontracted in trades, professions, supplies, etc. for which minority business enterprises bids could be solicited is less than 10%.

A waiver, as provided for by the Erie County Water Authority is hereby requested on the grounds that there are no/insufficient (circle the appropriate term) minority business enterprise in the market area of this project which do subcontracting in the following fields (list all trades, professions, supplies, etc. which could be subcontracted on this project):

1. _____ 6. _____
2. _____ 7. _____
3. _____ 8. _____
4. _____ 9. _____
5. _____ 10. _____

(use additional sheets if necessary)

If a partial waiver is granted the CONTRACTOR will make a good faith effort to meet the reduced goal.

_____ _____
DATE SIGNATURE OF AUTHORIZED REPRESENTATIVE OF COMPANY

Granted in whole _____

Granted in part _____

Comments _____

_____ / _____ _____
EQUAL OPPORTUNITY OFFICIAL TITLE DATE

_____ / _____ _____
LETTING DEPARTMENT REPRESENTATIVE TITLE DATE

ERIE COUNTY WATER AUTHORITY
MINORITY BUSINESS ENTERPRISE
JOINT VENTURE DISCLOSURE AFFIDAVIT

To Be Submitted With Part A
Where Applicable

Joint Ventures: _____
Name: _____
Address: _____
Principal Office: _____
Office Phone: _____
Home Phone: _____

Percent of minority ownership in terms of profit and loss sharings:

Capital contributions by each joint venture and accounting therefore:

Equipment and supply contributions by each joint venturer and accounting therefore:

Any ownership options for ownership or loans between the joint venturers - identify terms thereof:

How and by whom the on-site work will be supervised and administered:

I,_____ , as representative of _____Company, do hereby swear or affirm that I am authorized to act on its behalf and that in this capacity and to the best of my knowledge and belief, the information provided herewith relevant to the joint venture of _____ is accurate, complete and current, and fairly represents the joint venture; further, that I have personally reviewed the material and assured myself of its accuracy. It is recognized and acknowledged that the statements herein are being given under oath and any material misrepresentation will be grounds for terminating any contract which may be awarded in reliance hereon.

_____
SIGNATURE

ERIE COUNTY WATER AUTHORITY
MINORITY BUSINESS ENTERPRISE UTILIZATION REPORT - PART B

CONTRACTOR_____ CONTRACT NAME_____

I. List all bona fide minority business enterprises, Subcontractors, suppliers, professional personnel, or joint venture firms, with whom you have entered into a binding agreement in accordance with the Minority Business Utilization Goal set forth by the Erie County Water Authority. Include minority trucking firms that will be utilized and included and estimated dollar amount. This information must be submitted to the Erie County Water Authority when the project is 30% complete.

(USE REVERSE SIDE IF MORE SPACE IS NEEDED) MINORITY OWNED FIRMS	TYPE OF WORK	DATE CONTRACT EXECUTED	TOTAL EXPENDED TO DATE	AMOUNT REMAINING
NAME:_____ ADDRESS: _____ _____ IRS #:_____				
NAME:_____ ADDRESS: _____ _____ IRS #:_____				

*Erie County Water Authority reserves the right to require documentation including, but not limited to, canceled checks to verify these amounts:

II. Total Dollar Amount to be Subcontracted to minority Business Enterprise(s): $_____
III. Total dollar amount expended to date: $ _____
IV. Total amount of bid: $ _____
V. MBE Percent (%) of project bid: $ _____

I, _____ as an official representative of_____ _____ , do hereby certify that the information listed above is correct and complete.

_____ _____
NAME TITLE

_____
DATE

PART B CONTINUED

(USE REVERSE SIDE IF MORE SPACE IS NEEDED) MINORITY OWNED FIRMS	TYPE OF WORK	DATE CONTRACT EXECUTED	TOTAL EXPENDED TO DATE	AMOUNT REMAINING
NAME:_____ ADDRESS:_____ _____ IRS #: _____				
NAME: _____ ADDRESS: _____ _____ IRS #: _____				
NAME:_____ ADDRESS: _____ _____ IRS #:_____				
NAME:_____ ADDRESS: _____ _____ IRS #:_____				
NAME:_____ ADDRESS: _____ _____ IRS #:_____				
NAME:_____ ADDRESS: _____ _____ IRS #:_____				
NAME:_____ ADDRESS: _____ _____ IRS #:_____				
NAME:_____ ADDRESS: _____ _____ IRS #:_____				
NAME:_____ ADDRESS: _____ _____ IRS #:_____				

MINORITY BUSINESS ENTERPRISE UTILIZATION REPORT - PART C
CERTIFICATION OF EXPENDITURES TO MBE's

(To be completed by the prime CONTRACTOR and
submitted at the 75% payment level)

CONTRACTOR _____ CONTRACT: _____

MBE	PART B CONTRACT AMOUNT OF ESTIMATE	TOTAL EXPENDED TO DATE	ESTIMATED AMOUNT REMAINING

* Erie County Water Authority reserves the right to require documentation including, but not limited to, canceled checks to verify these amounts.

I, _____

_____as an official representative of _____,

do hereby certify that the information listed above is correct and complete.

_____
NAME

_____
TITLE

_____
DATE

MINORITY BUSINESS ENTERPRISE UTILIZATION REPORT - PART D

FINAL CERTIFICATION OF EXPENDITURES TO MBE's

(to be completed by the prime CONTRACTOR and submitted with the request for final payment)

CONTRACTOR: _____ CONTRACT: _____

MBE	TOTAL AMOUNT EXPENDED

TOTAL OF ALL MBE SUB-CONTRACTS $_____

AMOUNT OF CONTRACT _____

FINAL MBE PERCENTAGE _____

I, _____ , as an official

representative of _____ ,

do hereby certify that the information listed above is correct and complete.

_____
NAME

_____
TITLE

_____
DATE

ACCOUNTABILITY

The CONTRACTOR shall be fully accountable for its performance under this contract and agrees to answer under oath all questions relevant to the performance thereof and to any transaction, act, or omission had, done or omitted in connection therewith if called before the Erie County Water Authority, any Judicial, County or State Officer or agency empowered to investigate the Contract or its performance.

Appendix B
Insurance Requirements

GUENTHER PUMP STATION REHABILITATION

PROJECT NO: 201800138

The following minimum insurance requirements shall apply to vendors providing services to the Erie County Water Authority (the Authority). If a service or project, in the opinion of the Authority, represents an unusual or exceptional risk, the Authority may establish additional insurance requirements for that service or project. All insurance required herein shall be obtained at the sole cost and expense of the contractor, including deductibles and self-insured retentions, and shall be in full force and effect on the contract commencement date and for the duration of the contract. These requirements include but are not limited to the minimum insurance requirements.

Insurance Requirements:

a. Workers Compensation:
Part 1: Workers Compensation: Statutory
Part 2: Employers Liability: $1,000,000.
Note: If New York State domiciled employees are used, coverage to be New York Statutory for both Parts 1 and 2

b. **New York Disability Benefits Liability:** Statutory coverage if New York State domiciled employees are used.

c. Commercial General Liability:
- $2,000,000. General Aggregate
- $2,000,000. Products/Completed Operations Aggregate
- $1,000,000. Each Occurrence
- $1,000,000. Personal Injury/Advertising Liability
- Erie County Water Authority to be scheduled as an Additional Insured for both on-going and completed operations (attach Additional Insured endorsement to Certificate of Insurance)
- Insurance to be primary and non-contributory

d. Automobile Liability:
- $1,000,000. Each Accident
- Erie County Water Authority to be scheduled as an Additional Insured.

e. Contractors Pollution Liability (if work involves asbestos and/or lead abatement):
- $5,000,000. Each Occurrence
- $5,000,000. Aggregate
- Erie County Water Authority to be scheduled as an Additional Insured

f. Umbrella Liability:
- $5,000,000. Each Occurrence
- $5,000,000. Aggregate

- Erie County Water Authority to be scheduled as an Additional Insured

g. All-Risk Installation Floater: Builder's risk completed value form based on the total value of the project, providing coverage for work performed, equipment, supplies and materials at the project location, as well as any off-site storage location.

Certificates of Insurance to be provided to the Authority prior to start of work as follows:

ACORD 25 including copy of Additional Insured Endorsement Note: If coverage provided for NYS domiciled employees require Forms C 105.2 and DB 120.1 for Workers Compensation and NYS DBL.

Certificates of Insurance, on forms approved by the New York State Department of Insurance, must be submitted to the Authority prior to the award of contract. Renewals of Certificates of Insurance, on forms approved by the New York State Department of Insurance, must be received by the Authority 30 days prior to the expiration of the insurance policy period.

Certificates of Insurance and renewals, on forms approved by the New York State Department of Insurance, must be submitted to the Authority prior to the award of contract. Each insurance carrier issuing a Certificate of Insurance shall be rated by A. M. Best no lower than "A-" with a Financial Strength Code (FSC) of at least VII. The professional service provider shall name the Authority, its officers, agents and employees as additional insured on a Primary and Non-Contributory Basis, including a Waiver of Subrogation endorsement (form CG 20 26 11 85 or equivalent), on all applicable liability policies. Any liability coverage on a "claims made" basis should be designated as such on the Certificate of Insurance. Such insurance shall continue through the term of this Agreement and vendor shall purchase at his sole expense either 1) an Extended Reporting Endorsement (also, known as Tail Coverage); or 2) Prior Acts Coverage from new insurer with a retroactive date back to the date of, or prior to, the inception of this Agreement; or 3) demonstrate through Certificates of Insurance that vendor has Maintained continuous coverage with the same or original insurer. Coverage provided under items; 1), 2), or 3) will continue as long as the law allows.

To avoid confusion with similar insurance company names and to properly identify the insurance company, please make sure that the insurer's National Association of Insurance Commissioners (N.A.I.C.) identifying number or A. M. Best identifying number appears on the Certificate of Insurance. Also, at the top of the Certificate of Insurance, please list the project number.

Acceptance of a Certificate of Insurance and/or approval by the Authority shall not be construed to relieve the outside vendor of any obligations, responsibilities or liabilities.

Certificates of Insurance should be e-mailed to mmusarra@ecwa.org or mailed to Ms. Molly Jo Musarra, Claim Representative/Risk Manager Erie County Water Authority, 295 Main Street – Room 350, Buffalo, New York 14203-2494, or If you have any questions you can contact Ms. Musarra by e-mail or phone (716) 849-8465.

Appendix C
Prevailing Wage Rate Schedule

Andrew M. Cuomo, Governor

Roberta Reardon, Commissioner

Erie County Water Authority

Jacob Kocic, Engineer
285 Delaware Ave
Suite 500
Buffalo NY 14202

Schedule Year	2020
Date Requested	07/01/2020
PRC#	2020006721

Location	Guenther Pump Station
Project ID#	
Project Type	Rehabilitation of the existing potable water pump station and the construction of a new generator building addition.

PREVAILING WAGE SCHEDULE FOR ARTICLE 8 PUBLIC WORK PROJECT

Attached is the current schedule(s) of the prevailing wage rates and prevailing hourly supplements for the project referenced above. A unique Prevailing Wage Case Number (PRC#) has been assigned to the schedule(s) for your project.

The schedule is effective from July 2020 through June 2021. All updates, corrections, posted on the 1st business day of each month, and future copies of the annual determination are available on the Department's website www.labor.ny.gov. Updated PDF copies of your schedule can be accessed by entering your assigned PRC# at the proper location on the website.

It is the responsibility of the contracting agency or its agent to annex and make part, the attached schedule, to the specifications for this project, when it is advertised for bids and /or to forward said schedules to the successful bidder(s), immediately upon receipt, in order to insure the proper payment of wages.

Please refer to the "General Provisions of Laws Covering Workers on Public Work Contracts" provided with this schedule, for the specific details relating to other responsibilities of the Department of Jurisdiction.

Upon completion or cancellation of this project, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

NOTICE OF COMPLETION / CANCELLATION OF PROJECT

Date Completed: _____ Date Cancelled: _____

Name & Title of Representative: _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

General Provisions of Laws Covering Workers on Article 8 Public Work Contracts

Introduction

The Labor Law requires public work contractors and subcontractors to pay laborers, workers, or mechanics employed in the performance of a public work contract not less than the prevailing rate of wage and supplements (fringe benefits) in the locality where the work is performed.

Responsibilities of the Department of Jurisdiction

A Department of Jurisdiction (Contracting Agency) includes a state department, agency, board or commission: a county, city, town or village; a school district, board of education or board of cooperative educational services; a sewer, water, fire, improvement and other district corporation; a public benefit corporation; and a public authority awarding a public work contract.

The Department of Jurisdiction (Contracting Agency) awarding a public work contract MUST obtain a Prevailing Rate Schedule listing the hourly rates of wages and supplements due the workers to be employed on a public work project. This schedule may be obtained by completing and forwarding a "Request for wage and Supplement Information" form (PW 39) to the Bureau of Public Work. The Prevailing Rate Schedule MUST be included in the specifications for the contract to be awarded and is deemed part of the public work contract.

Upon the awarding of the contract, the law requires that the Department of Jurisdiction (Contracting Agency) furnish the following information to the Bureau: the name and address of the contractor, the date the contract was let and the approximate dollar value of the contract. To facilitate compliance with this provision of the Labor Law, a copy of the Department's "Notice of Contract Award" form (PW 16) is provided with the original Prevailing Rate Schedule.

The Department of Jurisdiction (Contracting Agency) is required to notify the Bureau of the completion or cancellation of any public work project. The Department's PW 200 form is provided for that purpose.

Both the PW 16 and PW 200 forms are available for completion online.

Hours

No laborer, worker, or mechanic in the employ of a contractor or subcontractor engaged in the performance of any public work project shall be permitted to work more than eight hours in any day or more than five days in any week, except in cases of extraordinary emergency. The contractor and the Department of Jurisdiction (Contracting Agency) may apply to the Bureau of Public Work for a dispensation permitting workers to work additional hours or days per week on a particular public work project.

There are very few exceptions to this rule. Complete information regarding these exceptions is available on the "Request for a dispensation to work overtime" form (PW30) and "4 Day / 10 Hour Work Schedule" form (PW 30.1).

Wages and Supplements

The wages and supplements to be paid and/or provided to laborers, workers, and mechanics employed on a public work project shall be not less than those listed in the current Prevailing Rate Schedule for the locality where the work is performed. If a prime contractor on a public work project has not been provided with a Prevailing Rate Schedule, the contractor must notify the Department of Jurisdiction (Contracting Agency) who in turn must request an original Prevailing Rate Schedule form the Bureau of Public Work. Requests may be submitted by: mail to NYSDOL, Bureau of Public Work, State Office Bldg. Campus, Bldg. 12, Rm. 130, Albany, NY 12240; Fax to Bureau of Public Work (518) 485-1870; or electronically at the NYSDOL website www.labor.ny.gov.

Upon receiving the original schedule, the Department of Jurisdiction (Contracting Agency) is REQUIRED to provide complete copies to all prime contractors who in turn MUST, by law, provide copies of all applicable county schedules to each subcontractor and obtain from each subcontractor, an affidavit certifying such schedules were received. If the original schedule expired, the contractor may obtain a copy of the new annual determination from the NYSDOL website www.labor.ny.gov.

The Commissioner of Labor makes an annual determination of the prevailing rates. This determination is in effect from July 1st through June 30th of the following year. The annual determination is available on the NYSDOL website www.labor.ny.gov.

Payrolls and Payroll Records

Every contractor and subcontractor MUST keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. As per Article 6 of the Labor law, contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, contemperaneous, true, and accurate payroll records. At a minimum, payrolls must show the following information for each person employed on a public work project: Name, Address, Last 4 Digits of Social Security Number, Classification(s) in which the worker was employed, Hourly wage rate(s) paid, Supplements paid

or provided, and Daily and weekly number of hours worked in each classification.

The filing of payrolls to the Department of Jurisdiction is a condition of payment.Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury. The Department of Jurisdiction (Contracting Agency) shall collect, review for facial validity, and maintain such payrolls.

In addition, the Commissioner of Labor may require contractors to furnish, with ten (10) days of a request, payroll records sworn to as their validity and accuracy for public work and private work. Payroll records include, but are not limited to time cards, work description sheets, proof that supplements were provided, cancelled payroll checks and payrolls. Failure to provide the requested information within the allotted ten (10) days will result in the withholding of up to 25% of the contract, not to exceed $100,000.00. If the contractor or subcontractor does not maintain a place of business in New York State and the amount of the contract exceeds $25,000.00, payroll records and certifications must be kept on the project worksite.

The prime contractor is responsible for any underpayments of prevailing wages or supplements by any subcontractor.

All contractors or their subcontractors shall provide to their subcontractors a copy of the Prevailing Rate Schedule specified in the public work contract as well as any subsequently issued schedules. A failure to provide these schedules by a contractor or subcontractor is a violation of Article 8, Section 220-a of the Labor Law.

All subcontractors engaged by a public work project contractor or its subcontractor, upon receipt of the original schedule and any subsequently issued schedules, shall provide to such contractor a verified statement attesting that the subcontractor has received the Prevailing Rate Schedule and will pay or provide the applicable rates of wages and supplements specified therein. (See NYS Labor Laws, Article 8 . Section 220-a).

Determination of Prevailing Wage and Supplement Rate Updates Applicable to All Counties

The wages and supplements contained in the annual determination become effective July 1st whether or not the new determination has been received by a given contractor. Care should be taken to review the rates for obvious errors. Any corrections should be brought to the Department's attention immediately. It is the responsibility of the public work contractor to use the proper rates. If there is a question on the proper classification to be used, please call the district office located nearest the project. Any errors in the annual determination will be corrected and posted to the NYSDOL website on the first business day of each month. Contractors are responsible for paying these updated rates as well, retroactive to July 1st.

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. To the extent possible, the Department posts rates in its possession that cover periods of time beyond the July 1st to June 30th time frame covered by a particular annual determination. Rates that extend beyond that instant time period are informational ONLY and may be updated in future annual determinations that actually cover the then appropriate July 1st to June 30th time period.

Withholding of Payments

When a complaint is filed with the Commissioner of Labor alleging the failure of a contractor or subcontractor to pay or provide the prevailing wages or supplements, or when the Commissioner of Labor believes that unpaid wages or supplements may be due, payments on the public work contract shall be withheld from the prime contractor in a sufficient amount to satisfy the alleged unpaid wages and supplements, including interest and civil penalty, pending a final determination.

When the Bureau of Public Work finds that a contractor or subcontractor on a public work project failed to pay or provide the requisite prevailing wages or supplements, the Bureau is authorized by Sections 220-b and 235.2 of the Labor Law to so notify the financial officer of the Department of Jurisdiction (Contracting Agency) that awarded the public work contract. Such officer MUST then withhold or cause to be withheld from any payment due the prime contractor on account of such contract the amount indicated by the Bureau as sufficient to satisfy the unpaid wages and supplements, including interest and any civil penalty that may be assessed by the Commissioner of Labor. The withholding continues until there is a final determination of the underpayment by the Commissioner of Labor or by the court in the event a legal proceeding is instituted for review of the determination of the Commissioner of Labor.

The Department of Jurisdiction (Contracting Agency) shall comply with this order of the Commissioner of Labor or of the court with respect to the release of the funds so withheld.

Summary of Notice Posting Requirements

The current Prevailing Rate Schedule must be posted in a prominent and accessible place on the site of the public work project. The prevailing wage schedule must be encased in, or constructed of, materials capable of withstanding adverse weather conditions and be titled "PREVAILING RATE OF WAGES" in letters no smaller than two (2) inches by two (2) inches.

The "Public Work Project" notice must be posted at the beginning of the performance of every public work contract, on each job site.

Every employer providing workers. compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers. Compensation Board in a conspicuous place on the jobsite.

Every employer subject to the NYS Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers, notices furnished by the State Division of Human Rights.

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the NYS Department of Labor.

Apprentices

Employees cannot be paid apprentice rates unless they are individually registered in a program registered with the NYS Commissioner of Labor. The allowable ratio of apprentices to journeyworkers in any craft classification can be no greater than the statewide building trade ratios promulgated by the Department of Labor and included with the Prevailing Rate Schedule. An employee listed on a payroll as an apprentice who is not registered as above or is performing work outside the classification of work for which the apprentice is indentured, must be paid the prevailing journeyworker's wage rate for the classification of work the employee is actually performing.

NYSDOL Labor Law, Article 8, Section 220-3, require that only apprentices individually registered with the NYS Department of Labor may be paid apprenticeship rates on a public work project. No other Federal or State Agency of office registers apprentices in New York State.

Persons wishing to verify the apprentice registration of any person must do so in writing by mail, to the NYSDOL Office of Employability Development / Apprenticeship Training, State Office Bldg. Campus, Bldg. 12, Albany, NY 12240 or by Fax to NYSDOL Apprenticeship Training (518) 457-7154. All requests for verification must include the name and social security number of the person for whom the information is requested.

The only conclusive proof of individual apprentice registration is written verification from the NYSDOL Apprenticeship Training Albany Central office. Neither Federal nor State Apprenticeship Training offices outside of Albany can provide conclusive registration information.

It should be noted that the existence of a registered apprenticeship program is not conclusive proof that any person is registered in that program. Furthermore, the existence or possession of wallet cards, identification cards, or copies of state forms is not conclusive proof of the registration of any person as an apprentice.

Interest and Penalties

In the event that an underpayment of wages and/or supplements is found:

- Interest shall be assessed at the rate then in effect as prescribed by the Superintendent of Banks pursuant to section 14-a of the Banking Law, per annum from the date of underpayment to the date restitution is made.
- A Civil Penalty may also be assessed, not to exceed 25% of the total of wages, supplements, and interest due.

Debarment

Any contractor or subcontractor and/or its successor shall be ineligible to submit a bid on or be awarded any public work contract or subcontract with any state, municipal corporation or public body for a period of five (5) years when:

- Two (2) willful determinations have been rendered against that contractor or subcontractor and/or its successor within any consecutive six (6) year period.
- There is any willful determination that involves the falsification of payroll records or the kickback of wages or supplements.

Criminal Sanctions

Willful violations of the Prevailing Wage Law (Article 8 of the Labor Law) may be a felony punishable by fine or imprisonment of up to 15 years, or both.

Discrimination

No employee or applicant for employment may be discriminated against on account of age, race, creed, color, national origin, sex, disability or marital status.

No contractor, subcontractor nor any person acting on its behalf, shall by reason of race, creed, color, disability, sex or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates (NYS Labor Law, Article 8, Section 220-e(a)).

No contractor, subcontractor, nor any person acting on its behalf, shall in any manner, discriminate against or intimidate any employee on account of race, creed, color, disability, sex, or national origin (NYS Labor Law, Article 8, Section 220-e(b)).

The Human Rights Law also prohibits discrimination in employment because of age, marital status, or religion.

There may be deducted from the amount payable to the contractor under the contract a penalty of $50.00 for each calendar day during which such person was discriminated against or intimidated in violation of the provision of the contract (NYS Labor Law, Article 8, Section 220-e(c)).

The contract may be cancelled or terminated by the State or municipality. All monies due or to become due thereunder may be forfeited for a second or any subsequent violation of the terms or conditions of the anti-discrimination sections of the contract (NYS Labor Law, Article 8, Section 220-e(d)).

Every employer subject to the New York State Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers notices furnished by the State Division of Human Rights.

Workers' Compensation

In accordance with Section 142 of the State Finance Law, the contractor shall maintain coverage during the life of the contract for the benefit of such employees as required by the provisions of the New York State Workers' Compensation Law.

A contractor who is awarded a public work contract must provide proof of workers' compensation coverage prior to being allowed to begin work.

The insurance policy must be issued by a company authorized to provide workers' compensation coverage in New York State. Proof of coverage must be on form C-105.2 (Certificate of Workers' Compensation Insurance) and must name this agency as a certificate holder.

If New York State coverage is added to an existing out-of-state policy, it can only be added to a policy from a company authorized to write workers' compensation coverage in this state. The coverage must be listed under item 3A of the information page.

The contractor must maintain proof that subcontractors doing work covered under this contract secured and maintained a workers' compensation policy for all employees working in New York State.

Every employer providing worker's compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers' Compensation Board in a conspicuous place on the jobsite.

Unemployment Insurance

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the New York State Department of Labor.

Andrew M. Cuomo, Governor

Roberta Reardon, Commissioner

Erie County Water Authority

Jacob Kocic, Engineer
285 Delaware Ave
Suite 500
Buffalo NY 14202

Schedule Year 2020
Date Requested 07/01/2020
PRC# 2020006721

Location Guenther Pump Station
Project ID#
Project Type Rehabilitation of the existing potable water pump station and the construction of a new generator building addition.

Notice of Contract Award

New York State Labor Law, Article 8, Section 220.3a requires that certain information regarding the awarding of public work contracts, be furnished to the Commissioner of Labor. One "Notice of Contract Award" (PW 16, which may be photocopied), **MUST** be completed for **EACH** prime contractor on the above referenced project.

Upon notifying the successful bidder(s) of this contract, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

Contractor Information
All information must be supplied

Federal Employer Identification Number: _____

Name: _____

Address: _____

_____

City: _____ State: _____ Zip: _____

Amount of Contract: $_____

Approximate Starting Date: ____/____/____

Approximate Completion Date: ____/____/____

Contract Type:
[ ] (01) General Construction
[ ] (02) Heating/Ventilation
[ ] (03) Electrical
[ ] (04) Plumbing
[ ] (05) Other : _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

Social Security Numbers on Certified Payrolls:

The Department of Labor is cognizant of the concerns of the potential for misuse or inadvertent disclosure of social security numbers. Identity theft is a growing problem and we are sympathetic to contractors' concern regarding inclusion of this information on payrolls if another identifier will suffice.

For these reasons, the substitution of the use of the last four digits of the social security number on certified payrolls submitted to contracting agencies on public work projects is now acceptable to the Department of Labor. This change does not affect the Department's ability to request and receive the entire social security number from employers during its public work/ prevailing wage investigations.

Construction Industry Fair Play Act: Required Posting for Labor Law Article 25-B § 861-d

Construction industry employers must post the "Construction Industry Fair Play Act" notice in a prominent and accessible place on the job site. Failure to post the notice can result in penalties of up to $1,500 for a first offense and up to $5,000 for a second offense. The posting is included as part of this wage schedule. Additional copies may be obtained from the NYS DOL website, www.labor.ny.gov. https://labor.ny.gov/formsdocs/ui/IA999.pdf
If you have any questions concerning the Fair Play Act, please call the State Labor Department toll-free at 1-866-435-1499 or email us at: dol.misclassified@labor.ny.gov .

Worker Notification: (Labor Law §220, paragraph a of subdivision 3-a)

This provision is an addition to the existing wage rate law, Labor Law §220, paragraph a of subdivision 3-a. It requires contractors and subcontractors to provide written notice to all laborers, workers or mechanics of the *prevailing wage rate* for their particular job classification *on each pay stub**. It also requires contractors and subcontractors to *post a notice* at the beginning of the performance of every public work contract *on each job site* that includes the telephone number and address for the Department of Labor and a statement informing laborers, workers or mechanics of their right to contact the Department of Labor if he/she is not receiving the proper prevailing rate of wages and/or supplements for his/her job classification. The required notification will be provided with each wage schedule, may be downloaded from our website *www.labor.ny.gov* or be made available upon request by contacting the Bureau of Public Work at 518-457-5589. *In the event the required information will not fit on the pay stub, an accompanying sheet or attachment of the information will suffice.

(05.19)

To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND

Budget Policy & Reporting Manual

B-610

Public Work Enforcement Fund

effective date December 7, 2005

---

1. Purpose and Scope:

This Item describes the Public Work Enforcement Fund (the Fund, PWEF) and its relevance to State agencies and public benefit corporations engaged in construction or reconstruction contracts, maintenance and repair, and announces the recently-enacted increase to the percentage of the dollar value of such contracts that must be deposited into the Fund. This item also describes the roles of the following entities with respect to the Fund:

- New York State Department of Labor (DOL),
- The Office of the State of Comptroller (OSC), and
- State agencies and public benefit corporations.

2. Background and Statutory References:

DOL uses the Fund to enforce the State's Labor Law as it relates to contracts for construction or reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law. State agencies and public benefit corporations participating in such contracts are required to make payments to the Fund.

Chapter 511 of the Laws of 1995 (as amended by Chapter 513 of the Laws of 1997, Chapter 655 of the Laws of 1999, Chapter 376 of the Laws of 2003 and Chapter 407 of the Laws of 2005) established the Fund.

3. Procedures and Agency Responsibilities:

The Fund is supported by transfers and deposits based on the value of contracts for construction and reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law, into which all State agencies and public benefit corporations enter.

Chapter 407 of the Laws of 2005 increased the amount required to be provided to this fund to .10 of one-percent of the total cost of each such contract, to be calculated at the time agencies or public benefit corporations enter into a new contract or if a contract is amended. The provisions of this bill became effective August 2, 2005.

To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND

OSC will report to DOL on all construction-related ("D") contracts approved during the month, including contract amendments, and then DOL will bill agencies the appropriate assessment monthly. An agency may then make a determination if any of the billed contracts are exempt and so note on the bill submitted back to DOL. For any instance where an agency is unsure if a contract is or is not exempt, they can call the Bureau of Public Work at the number noted below for a determination. Payment by check or journal voucher is due to DOL within thirty days from the date of the billing. DOL will verify the amounts and forward them to OSC for processing.

For those contracts which are not approved or administered by the Comptroller, monthly reports and payments for deposit into the Public Work Enforcement Fund must be provided to the Administrative Finance Bureau at the DOL within 30 days of the end of each month or on a payment schedule mutually agreed upon with DOL.

Reports should contain the following information:

- Name and billing address of State agency or public benefit corporation;
- State agency or public benefit corporation contact and phone number;
- Name and address of contractor receiving the award;
- Contract number and effective dates;
- Contract amount and PWEF assessment charge (if contract amount has been amended, reflect increase or decrease to original contract and the adjustment in the PWEF charge); and
- Brief description of the work to be performed under each contract.

Checks and Journal Vouchers, payable to the "New York State Department of Labor" should be sent to:

Department of Labor
Administrative Finance Bureau-PWEF Unit
Building 12, Room 464
State Office Campus
Albany, NY 12240

Any questions regarding billing should be directed to NYSDOL's Administrative Finance Bureau-PWEF Unit at (518) 457-3624 and any questions regarding Public Work Contracts should be directed to the Bureau of Public Work at (518) 457-5589.

NEW YORK STATE OF OPPORTUNITY. Department of Labor

Required Notice under Article 25-B of the Labor Law

Attention All Employees, Contractors and Subcontractors: You are Covered by the Construction Industry Fair Play Act

The law says that you are an employee unless:

- You are free from direction and control in performing your job, **and**
- You perform work that is not part of the usual work done by the business that hired you, **and**
- You have an independently established business.

Your employer cannot consider you to be an independent contractor unless all three of these facts apply to your work.

It is against the law for an employer to misclassify employees as independent contractors or pay employees off the books.

Employee Rights: If you are an employee, you are entitled to state and federal worker protections. These include:

- Unemployment Insurance benefits, if you are unemployed through no fault of your own, able to work, and otherwise qualified,
- Workers' compensation benefits for on-the-job injuries,
- Payment for wages earned, minimum wage, and overtime (under certain conditions),
- Prevailing wages on public work projects,
- The provisions of the National Labor Relations Act, and
- A safe work environment.

It is a violation of this law for employers to retaliate against anyone who asserts their rights under the law. Retaliation subjects an employer to civil penalties, a private lawsuit or both.

Independent Contractors: If you are an independent contractor**, you must pay all taxes and Unemployment Insurance contributions required by New York State and Federal Law.**

Penalties for paying workers off the books or improperly treating employees as independent contractors:

• **Civil Penalty**	First offense: Up to $2,500 per employee Subsequent offense(s): Up to $5,000 per employee
• **Criminal Penalty**	First offense: Misdemeanor - up to 30 days in jail, up to a $25,000 fine and debarment from performing public work for up to one year. Subsequent offense(s): Misdemeanor - up to 60 days in jail or up to a $50,000 fine and debarment from performing public work for up to 5 years.

If you have questions about your employment status or believe that your employer may have violated your rights and you want to file a complaint, call the Department of Labor at (866) 435-1499 or send an email to dol.misclassified@labor.ny.gov. All complaints of fraud and violations are taken seriously. You can remain anonymous.

Employer Name:

New York State Department of Labor
Bureau of Public Work

Attention Employees

THIS IS A:

PUBLIC WORK PROJECT

If you are employed on this project as a **worker, laborer, or mechanic** you are entitled to receive the **prevailing wage and supplements rate** for the classification at which you are working.

Chapter 629 of the Labor Laws of 2007:

These wages are set by law and must be posted at the work site. They can also be found at: www.labor.ny.gov

If you feel that you have not received proper wages or benefits, please call our nearest office.*

Albany	(518) 457-2744	Patchogue	(631) 687-4882
Binghamton	(607) 721-8005	Rochester	(585) 258-4505
Buffalo	(716) 847-7159	Syracuse	(315) 428-4056
Garden City	(516) 228-3915	Utica	(315) 793-2314
New York City	(212) 932-2419	White Plains	(914) 997-9507
Newburgh	(845) 568-5156		

* For New York City government agency construction projects, please contact the Office of the NYC Comptroller at (212) 669-4443, or www.comptroller.nyc.gov – click on Bureau of Labor Law.

Contractor Name: _____

Project Location: _____

Requirements for OSHA 10 Compliance

Article 8 §220-h requires that when the advertised specifications, for every contract for public work, is $250,000.00 or more the contract must contain a provision requiring that every worker employed in the performance of a public work contract shall be certified as having completed an OSHA 10 safety training course. The clear intent of this provision is to require that all employees of public work contractors, required to be paid prevailing rates, receive such training “prior to the performing any work on the project.”

The Bureau will enforce the statute as follows:

All contractors and sub contractors must attach a copy of proof of completion of the OSHA 10 course to the first certified payroll submitted to the contracting agency and on each succeeding payroll where any new or additional employee is first listed.

Proof of completion may include but is not limited to:

- Copies of bona fide course completion card (*Note: Completion cards do not have an expiration date.)*
- Training roster, attendance record of other documentation from the certified trainer pending the issuance of the card.
- Other valid proof

**A certification by the employer attesting that all employees have completed such a course is not sufficient proof that the course has been completed.

Any questions regarding this statute may be directed to the New York State Department of Labor, Bureau of Public Work at 518-457-5589.

WICKS

Public work projects are subject to the Wicks Law requiring separate specifications and bidding for the plumbing, heating and electrical work, when the total project's threshold is $3 million in Bronx, Kings, New York, Queens and, Richmond counties; $1.5 million in Nassau, Suffolk and Westchester counties; and $500,000 in all other counties.

For projects below the monetary threshold, bidders must submit a sealed list naming each subcontractor for the plumbing, HVAC and electrical and the amount to be paid to each. The list may not be changed unless the public owner finds a legitimate construction need, including a change in specifications or costs or the use of a Project Labor Agreement (PLA), and must be open to public inspection.

Allows the state and local agencies and authorities to waive the Wicks Law and use a PLA if it will provide the best work at the lowest possible price. If a PLA is used, all contractors shall participate in apprentice training programs in the trades of work it employs that have been approved by the Department of Labor (DOL) for not less than three years. They shall also have at least one graduate in the last three years and use affirmative efforts to retain minority apprentices. PLA's would be exempt from Wicks, but deemed to be public work subject to prevailing wage enforcement.

The Commissioner of Labor shall have the power to enforce separate specification requirement s on projects, and may issue stop-bid orders against public owners for non-compliance.

Other new monetary thresholds, and similar sealed bidding for non-Wicks projects, would apply to certain public authorities including municipal housing authorities, NYC Construction Fund, Yonkers Educational Construction Fund, NYC Municipal Water Finance Authority, Buffalo Municipal Water Finance Authority, Westchester County Health Care Association, Nassau County Health Care Corp., Clifton-Fine Health Care Corp., Erie County Medical Center Corp., NYC Solid Waste Management Facilities, and the Dormitory Authority.

Contractors must pay subcontractors within a 7 days period.

(07.19)

Introduction to the Prevailing Rate Schedule

Information About Prevailing Rate Schedule

This information is provided to assist you in the interpretation of particular requirements for each classification of worker contained in the attached Schedule of Prevailing Rates.

Classification

It is the duty of the Commissioner of Labor to make the proper classification of workers taking into account whether the work is heavy and highway, building, sewer and water, tunnel work, or residential, and to make a determination of wages and supplements to be paid or provided. It is the responsibility of the public work contractor to use the proper rate. If there is a question on the proper classification to be used, please call the district office located nearest the project. District office locations and phone numbers are listed below.

Prevailing Wage Schedules are issued separately for "General Construction Projects" and "Residential Construction Projects" on a county-by-county basis.

General Construction Rates apply to projects such as: Buildings, Heavy & Highway, and Tunnel and Water & Sewer rates.

Residential Construction Rates generally apply to construction, reconstruction, repair, alteration, or demolition of one family, two family, row housing, or rental type units intended for residential use.

Some rates listed in the Residential Construction Rate Schedule have a very limited applicability listed along with the rate. Rates for occupations or locations not shown on the residential schedule must be obtained from the General Construction Rate Schedule. Please contact the local Bureau of Public Work office before using Residential Rate Schedules, to ensure that the project meets the required criteria.

Payrolls and Payroll Records

Contractors and subcontractors are required to establish, maintain, and preserve for not less that six (6) years, contemporaneous, true, and accurate payroll records.

Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury.

Paid Holidays

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

Overtime

At a minimum, all work performed on a public work project in excess of eight hours in any one day or more than five days in any workweek is overtime. However, the specific overtime requirements for each trade or occupation on a public work project may differ. Specific overtime requirements for each trade or occupation are contained in the prevailing rate schedules.

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays.

The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Supplemental Benefits

Particular attention should be given to the supplemental benefit requirements. Although in most cases the payment or provision of supplements is straight time for all hours worked, some classifications require the payment or provision of supplements, or a portion of the supplements, to be paid or provided at a premium rate for premium hours worked. Supplements may also be required to be paid or provided on paid holidays, regardless of whether the day is worked. The Overtime Codes and Notes listed on the particular wage classification will indicate these conditions as required.

Effective Dates

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. The rate listed is valid until the next effective rate change or until the new annual determination which takes effect on July 1 of each year. All contractors and subcontractors are required to pay the current prevailing rates of wages and supplements. If you have any questions please contact the Bureau of Public Work or visit the New York State Department of Labor website (www.labor.ny.gov) for current wage rate information.

Apprentice Training Ratios

The following are the allowable ratios of registered Apprentices to Journey-workers.

For example, the ratio 1:1,1:3 indicates the allowable initial ratio is one Apprentice to one Journeyworker. The Journeyworker must be in place on the project before an Apprentice is allowed. Then three additional Journeyworkers are needed before a second Apprentice is allowed. The last ratio repeats indefinitely. Therefore, three more Journeyworkers must be present before a third Apprentice can be hired, and so on.

Please call Apprentice Training Central Office at (518) 457-6820 if you have any questions.

Title (Trade)	Ratio
Boilermaker (Construction)	1:1,1:4
Boilermaker (Shop)	1:1,1:3
Carpenter (Bldg.,H&H, Pile Driver/Dockbuilder)	1:1,1:4
Carpenter (Residential)	1:1,1:3
Electrical (Outside) Lineman	1:1,1:2
Electrician (Inside)	1:1,1:3
Elevator/Escalator Construction & Modernizer	1:1,1:2
Glazier	1:1,1:3
Insulation & Asbestos Worker	1:1,1:3
Iron Worker	1:1,1:4
Laborer	1:1,1:3
Mason	1:1,1:4
Millwright	1:1,1:4
Op Engineer	1:1,1:5
Painter	1:1,1:3
Plumber & Steamfitter	1:1,1:3
Roofer	1:1,1:2
Sheet Metal Worker	1:1,1:3
Sprinkler Fitter	1:1,1:2

If you have any questions concerning the attached schedule or would like additional information, please contact the nearest BUREAU of PUBLIC WORK District Office or write to:

New York State Department of Labor
Bureau of Public Work
State Office Campus, Bldg. 12
Albany, NY 12240

District Office Locations:	Telephone #	FAX #
Bureau of Public Work - Albany	518-457-2744	518-485-0240
Bureau of Public Work - Binghamton	607-721-8005	607-721-8004
Bureau of Public Work - Buffalo	716-847-7159	716-847-7650
Bureau of Public Work - Garden City	516-228-3915	516-794-3518
Bureau of Public Work - Newburgh	845-568-5287	845-568-5332
Bureau of Public Work - New York City	212-932-2419	212-775-3579
Bureau of Public Work - Patchogue	631-687-4882	631-687-4902
Bureau of Public Work - Rochester	585-258-4505	585-258-4708
Bureau of Public Work - Syracuse	315-428-4056	315-428-4671
Bureau of Public Work - Utica	315-793-2314	315-793-2514
Bureau of Public Work - White Plains	914-997-9507	914-997-9523
Bureau of Public Work - Central Office	518-457-5589	518-485-1870

Erie County General Construction

Boilermaker — 07/01/2020

JOB DESCRIPTION Boilermaker **DISTRICT** 12

ENTIRE COUNTIES
Allegany, Cattaraugus, Chautauqua, Chemung, Erie, Genesee, Livingston, Monroe, Niagara, Ontario, Orleans, Schuyler, Steuben, Wayne, Wyoming, Yates

WAGES

Per hours:	07/01/2020
Boilermaker	$ 35.10

The wage rate will be 90% of the above for Maintenance work on boilers less than 100,000 pph.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS
Per hour: $ 30.74*

*NOTE: $29.50 of this amount is for every Hour "Paid"

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
1st Term at 12 Months
Terms 3-8 at 6 Months
Per Hour:
1st 65%
3rd 70% 4th 75% 5th 80% 6th 85% 7th 90% 8th 95%

Supplemental Benefits per hour:

All Terms $ 30.74**

**NOTE: $29.50 of this amount is for every Hour "Paid"

12-7

Carpenter - Building — 07/01/2020

JOB DESCRIPTION Carpenter - Building **DISTRICT** 12

ENTIRE COUNTIES
Erie

PARTIAL COUNTIES
Cattaraugus: Townships of Persia and Perrysburg

WAGES

Per hour:	07/01/2020
Building:	
Carpenter	$ 32.75
FloorLayer	32.75
Certified Welder	33.75
Hazardous Waste Worker	34.25
Diver-Dry Day	33.75
Diver Tender	33.75
Diver-Wet Day***	61.25

Hazardous Waste Worker: Hazardous sites requiring personal protective equipment.

*** Diver rate applies to all hours worked on the day of dive.

Depth pay for divers:	0' to 80'	no additional fee
	81' to 100'	additional $0.50 per foot
	101' to 150'	additional $0.75 per foot
	151' and deeper	additional $1.25 per foot
Penetration pay:	0' to 50'	no additional fee
	51' to 100'	additional $0.75 per foot
	101' and deeper	additional $1.00 per foot

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule' as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS
Per hour worked:

Carpenter(s)	$ 28.38
Diver(s)	28.38

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

One year terms at the following percentage of Journeyman's base wage:
Apprentices Indentured Prior to 01/01/2016 and
Floorlayer Apprentices Indentured after 01/01/2016

1st	2nd	3rd	4th
50%	60%	70%	80%

Carpenter Apprentices Indentured After 01/01/2016

1st	2nd	3rd	4th	5th
50%	60%	65%	70%	80%

Supplemental Benefits per hour worked:

1st	2nd	3rd	4th	5th
$12.00	$12.00	$14.65	$14.65	$14.65

12-276B-Cat

Carpenter - Building / Heavy&Highway — 07/01/2020

JOB DESCRIPTION Carpenter - Building / Heavy&Highway **DISTRICT** 2

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

PARTIAL COUNTIES
Orange: The area lying on Northern side of Orange County demarcated by a line drawn from the Bear Mountain Bridge continuing west to the Bear Mountain Circle, continue North on 9W to the town of Cornwall where County Road 107 (also known as Quaker Rd) crosses under 9W, then east on County Road 107 to Route 32, then north on Route 32 to Orrs Mills Rd, then west on Orrs Mills Rd to Route 94, continue west and south on Route 94 to the Town of Chester, to the intersection of Kings Highway, continue south on Kings Highway to Bellvale Rd, west on Bellvale Rd to Bellvale Lakes Rd, then south on Bellvale Lakes Rd to Kain Rd, southeast on Kain Rd to Route 17A, then north and southeast along Route 17A to Route 210, then follow Route 210 to NJ Border.

WAGES

Wages per hour:	07/01/2020	07/01/2021 Additional
Carpenter - ONLY for Artificial Turf/Synthetic Sport Surface	$ 31.48	$ 1.15

Note - Does not include the operation of equipment. Please see Operating Engineers rates.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyman	$ 23.65

OVERTIME PAY
See (B, E, Q, X) on OVERTIME PAGE

HOLIDAY
Paid: See (5) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE
Notes:
When a holiday falls upon a Saturday, it shall be observed on the preceding Friday. Whan a holiday falls upon a Sunday, it shall be observed on the following Monday.
An employee taking an unexcused day off the regularly scheduled day before or after a paid Holiday shall not receive Holiday pay.

REGISTERED APPRENTICES
Wages per hour:

One year terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th
55%	60%	70%	80%

Supplemental Benefits per hour:

1st year term	$ 11.80
2nd year term	11.80
3rd year term	14.45
4th year term	14.45

2-42AtSS

Carpenter - Heavy&Highway — 07/01/2020

JOB DESCRIPTION Carpenter - Heavy&Highway **DISTRICT** 12

ENTIRE COUNTIES
Erie

WAGES
Per hour:

	07/01/2020
Carpenter	$ 35.53
Certified Welder	37.03
Diver-Dry Day	36.53
Diver-Wet Day**	60.53
Diver Tender	36.53
Hazardous Material Worker	37.03
Piledriver	35.53
Millwright	37.03
Effluent & Slurry Diver-Dry Day	54.79
Effluent & Slurry Diver-Wet Day	90.97

Hazardous Waste Worker: Hazardous sites requiring personal protective equipment.

** Diver rate applies to all hours worked on the day of dive.

Depth pay for divers:	0' to 50'	no additional fee
	51'to 100'	additional $0.50 per foot
	101' to 150'	additional $0.75 per foot
	151' to 200'	additional $1.25 per foot
Penetration pay:	0' to 50'	no additional fee
	51' to 100'	additional $0.75 per foot
	101' to deeper	additional $1.00 per foot

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour worked:

Carpenter(s)	$ 29.45
Diver(s)	29.45

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (2, 17) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

One year terms at the following percentage of Journeyman's wage:
Indentured Prior to 01/01/2016

1st	2nd	3rd	4th
55%	60%	70%	80%

Indentured After 01/01/2016

1st	2nd	3rd	4th	5th
55%	60%	65%	70%	80%

Pile Driver Apprentice(1300hour terms at percentage of Pile Driver Rate)

1st	2nd	3rd	4th
50%	60%	70%	80%

Supplemental benefits per hour worked:

1st	2nd	3rd	4th	5th
$11.80	$11.80	$14.45	$14.45	$14.45

12-276HH-Erie

Electrician — 07/01/2020

JOB DESCRIPTION Electrician **DISTRICT** 3

ENTIRE COUNTIES
Erie

PARTIAL COUNTIES
Cattaraugus: Only the Townships of Ashford, East Otto, Ellicottville, Farmersville, Freedom, Franklinville, Lyndon, Machias, Mansfield, New Albion, Otto, Perrysburg, Persia and Yorkshire.
Genesee: Only the Townships of Alabama, Alexander, Darien, Oakfield,Pembroke and that portion of the Towns of Batavia and Elba that are west of Little Tonawanda Creek; Tonawanda Creek; the City limits of Batavia (in effect prior to Feb. 1, 1970) and State Highway 98 north of the City of Batavia, then north on Highway 98 to the Orleans County line.
Wyoming: Only the Townships of Arcade, Attica, Bennington, Eagle, Java, Orangeville, Sheldon and Wethersfield.

WAGES
Per hour: 07/01/2020

Electrician*	$ 37.44

* Includes teledata work

When shift work is mandated either in the job specification or by the contracting agency the following premiums apply:
17.3% for work from 4:30PM - 1:00AM
31.4% for work from 12:30AM - 9:00AM
Additional $0.50/hr in shafts over 25 ft. deep and in underground tunnels over 75 ft. long.
Additional $0.75/hr for work on toothpicks, structural steel, temporary platforms, swinging scaffolds, boatswain chairs, smoke stacks or water towers 30 ft above the floor or for work on rolling scaffolds and ladders over 50 ft.
Additional $1.50/hr for Cable Splicers on such work as lead, and shielded cable and splices or terminations on cable 5KV and above.
Additional $1.00/hr for Hot work (Atomic plants).
Additional $2.00/hr for work on radio, TV, light towers and floating platforms or climbing ladders in excess of 100 ft. high.

SUPPLEMENTAL BENEFITS
Per hour:
$ 28.10*
* NOTE - add 3% of the posted straight time or applicable premium wage rate.

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

Hour terms at the following wages:

0 to 1000	1000 to 2000	2000 to 3500	3500 to 5000	5000 to 6500	6500 to 8000
$ 13.85	$ 14.98	$ 16.85	$ 20.59	$ 26.21	$ 29.95

Supplemental benefits per hour:

0 to 2000	2000 to 6500	6500 to 8200
$ 12.51*	$ 22.75*	$ 28.10*

* NOTE - add 3% of the posted straight time or applicable premium wage rate.

3-41

Elevator Constructor — 07/01/2020

JOB DESCRIPTION Elevator Constructor **DISTRICT** 3

ENTIRE COUNTIES
Allegany, Cattaraugus, Chautauqua, Erie, Genesee, Niagara, Orleans, Wyoming

WAGES

Per hour:	07/01/2020
Elevator Constructor	$ 51.44
Helper	36.01

** IMPORTANT NOTICE - EFFECTIVE 04/01/2009 **
Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday or Tuesday thru Friday.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS
Per hour:

$ 34.77

Note - add 6% of regular hourly rate for all hours worked.

OVERTIME PAY
See (D, O) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 15, 16) on HOLIDAY PAGE
Overtime: See (5, 6, 15, 16) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

One year (1,700 hour each) terms at the following percentage of Journeyman's wage:

1st*	2nd	3rd	4th
55%	65%	70%	80%

Supplemental benefits per hour:

$ 34.77

* Note - 0-6 months of the 1st year term is paid at 50% of Journeyman's wage with no Supplemental benefits.

Note - add 6% of regular hourly rate for all hours worked.

3-14

Glazier — 07/01/2020

JOB DESCRIPTION Glazier **DISTRICT** 3

ENTIRE COUNTIES
Allegany, Cattaraugus, Chautauqua, Erie, Genesee, Niagara, Orleans, Wyoming

WAGES

Per hour:	07/01/2020	05/01/2021

		Additional
Glazier	$ 27.50	$ 1.20
Working off Suspended Scaffold (Swing Stage)	28.50	1.20
Maintenance	17.21*	0.90

* Note - This rate to be used only for all repair and replacement work such as glass breakage, glass replacement, door repair and board ups.

** IMPORTANT NOTICE **
Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS
Per hour:

Journeymen Glazier	$ 23.37
Maintenance	14.83

OVERTIME PAY
See (B, E2, F, R) on OVERTIME PAGE

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE for Glazier and Glazier Apprentices.
Paid:	See (5, 6) on HOLIDAY PAGE for Maintenance
Overtime:	See (5, 6) on HOLIDAY PAGE.

REGISTERED APPRENTICES
Wages per hour:

Glazier: 1000 hour terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	90%

Supplemental benefits per hour:

1st & 2nd terms	$ 8.00
3rd & 4th terms	8.85
All other terms	10.25

3-660

Insulator - Heat & Frost — 07/01/2020

JOB DESCRIPTION Insulator - Heat & Frost **DISTRICT** 3

ENTIRE COUNTIES
Allegany, Cattaraugus, Chautauqua, Erie, Niagara, Wyoming

PARTIAL COUNTIES
Genesee: Only the Townships of Alabama, Alexander, Darien, Oakfield and Pembroke.

WAGES
Per Hour: 07/01/2020

Heat & Frost Insulator	$ 34.15

SUPPLEMENTAL BENEFITS
Per hour:

$ 24.69

OVERTIME PAY
See (B, *E, **Q) on OVERTIME PAGE
* Note - Double time after 10 hours on Saturday.
** Note - Triple time on Labor Day if WORKED.

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

One year terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th

50% 60% 70% 80%

Supplemental Benefits per hour:

1st and 2nd	$ 19.64
All other terms	$ 24.69

3-4

Ironworker **07/01/2020**

JOB DESCRIPTION Ironworker **DISTRICT** 3

ENTIRE COUNTIES
Cattaraugus, Chautauqua

PARTIAL COUNTIES
Allegany: Entire county except the Towns of Birdsall, Burns and Grove.
Erie: All except the Town of Grand Island north of Whitehaven Road.
Genesee: Only the Townships of Alabama, Alexander, Darien and Pembroke
Steuben: Only the Townships of Canisteo, Freemont, Greenwood,Hartsville, Hornell, Hornellsville, Howard, Jasper, Troupsburg and West Union
Wyoming: Only the Townships of Arcade, Attica, Bennington, Eagle,Gainsville, Java, Orangeville, Pike, Sheldon, Warsaw and Wethersfield.

WAGES

Per hour:	07/01/2020	07/01/2021 Additional
Structural	$ 31.45	$ 1.25
Ornamental	31.45	1.25
Layout	31.45	1.25
Rodmen	31.45	1.25
Reinforcing	31.45	1.25
Welders	31.45	1.25
Riggers & Mach. Movers	31.45	1.25
Curtain Wall Erector	31.45	1.25
Window Erector	29.10	1.25
Fence Erector	30.02	1.25

SUPPLEMENTAL BENEFITS
Per hour:

Fence erectors	$ 28.05
All others	29.55

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

One year terms at the following wage:

1st	2nd	3rd	4th
$ 16.50	$ 18.50	$ 20.50	$ 22.50

Supplemental benefits per hour:

1st	2nd	3rd	4th
$ 12.59	$ 22.26	$ 23.65	$ 25.03

3-6

Ironworker **07/01/2020**

JOB DESCRIPTION Ironworker **DISTRICT** 3

ENTIRE COUNTIES
Niagara

PARTIAL COUNTIES
Erie: Only that portion of the Township of Grand Island north of Whitehaven Road.
Orleans: Only the Townships of Ridgeway, Shelby and Yates.

WAGES
Per hour: 07/01/2020

Structural	$ 30.90
Ornamental	30.90
Reinforcing	30.90
Rigger & Mach. Mover	30.90
Pre-Engineered	30.90
Fence Erector	30.90
Pre-Cast Erector	30.90
Welder	30.90
Window Erector	30.90

SUPPLEMENTAL BENEFITS
Per hour:

$ 30.35

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

One year terms at the following wage:

1st term	$ 16.50
2nd term	18.50
3rd term	20.50
4th term	22.50

Supplemental benefits per hour:

1st term	$ 11.70
2nd term	19.19
3rd term	20.26
4th term	21.33

3-9

Laborer - Building — 07/01/2020

JOB DESCRIPTION Laborer - Building **DISTRICT** 3

ENTIRE COUNTIES
Erie

PARTIAL COUNTIES
Cattaraugus: Only the Townships of Perrysburg and the Village Gowanda.

WAGES
CLASS A: Basic, Safety Man, Flagman, Tool Room Man, Nurseryman, Demolition Worker, Top Man, Wrecker, IBC Barriers Except on Structures, Guard Rail, Asphalt Shovelers, Foundation Laborer over 8' in Depth, Hod Carriers, Plaster Tender, Plaster Scaffold Builder, Pneumatic Gas, Electric Tool Operator including all forms of Busters, Jackhammers and Chipping Guns, Steel Burners.

CLASS B: Mortar Mixer, Asphalt Smoothers, Pneumatic Gas, Electric Tool Operator including all forms of Busters, Jackhammers and Chipping Guns over 8' in depth.

CLASS C: Worker on any Swing Scaffold, Blaster, Plumbing Laborer, Wagon Drill Operator, Bottomman (caisson or cofferdam), Laser Setter, Asphalt Rakers, Asphalt Screed Man.

CLASS D: Stone Cutter, Curb Setter and Flag Layer.

CLASS E: Wearing of replaceable cartridge respirator.

CLASS F: Asbestos Removal, Deleader.

CLASS G: Hazardous Waste Worker.

Per hour:	07/01/2020
Building Laborer:	
CLASS A	$ 28.78
CLASS B	28.95

CLASS C	29.06
CLASS D	29.53
CLASS E	29.78
CLASS F	30.28
CLASS G	30.78

SUPPLEMENTAL BENEFITS
Per hour:
$ 26.75

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (22) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

Hour terms at the following percentage of Journeyman's wage:

0 to 500	to 1000	to 1500	to 2000	to 2500	to 3000	to 4000
55%	60%	65%	70%	75%	80%	90%

Supplemental benefits per hour:
$ 26.75

3-210b

Laborer - Heavy&Highway — 07/01/2020

JOB DESCRIPTION Laborer - Heavy&Highway **DISTRICT** 3

ENTIRE COUNTIES
Erie

WAGES
Heavy/Highway Laborer:
GROUP A: Basic, Drill Helper, Flagman, Outboard and Hand Boats, Demolition Worker, Nurseryman, IBC Barriers (except on structures), Guard Rails, Road Markers.

GROUP B: Grade Checker, Chain Saw, Concrete Aggregate Bin, Concrete Bootmen, Gin Buggy, Hand or Machine Vibrator, Jack Hammer, Mason Tender, Mortar Mixer, Pavement Breaker, Handlers of Steel Mesh, Small Generators for Laborers' Tools, Pipe Layers, Vibrator Type Rollers, Tamper, Drill Doctor, Tail or Screw Operator on Asphalt Paver, Water Pump Operators (2" and Single Diaphragm), Nozzle (Asphalt, Gunite, Seeding, and Sand Blasting), Laborers on Chain Link Fence Erection, Rock Splitter and Power Unit, Pusher Type Concrete Saw and all other Gas, Electric, Oil and Air Tool Operators, Wrecking Laborer and Laser Man.

GROUP C: All Rock or Drilling Machine Operators (Except Quarry Master and Similar Type), Acetylene Torch Operators, Asphalt Raker, Powderman and Welder.

GROUP D: Blasters, Curb and Flatwork Formsetter not on structures, Stone or Granite Curb Setters and Stone Cutter.

Per hour:	07/01/2020	07/01/2021
Heavy/Highway Laborer:		Additional
GROUP A	$ 31.06	$ 1.25
GROUP B	31.26	1.25
GROUP C	31.46	1.25
GROUP D	31.66	1.25

For all Deleader & Asbestos work add $1.50 to Group A rate.
For all Hazardous waste work add $2.00 to Group A rate.
For use of replaceable cartridge respirator add $1.00 to Group A rate.
An additional $3.00 per hour is required when a single irregular work shift starting any time from 5:00PM to 1:00AM is mandated either in the job specification or by the contracting agency.

Sewer/Water Laborer:
GROUP A: Basic, Flagman, Top man, Wreckers.

GROUP B: Foundation, Plaster tender, Scaffold bootman, Pneumatic, gas, electric, tool operator, jackhammer, chipping guns.

GROUP C: Mortar Mixer, over 8 ft. in depth.

GROUP D: Pavement formsetter, Steelburner, Caisson, Wagon Drill Oper., PipeLayer, Swing Scaffold.

GROUP E: Utility pave driver, Laser operator.

GROUP F: Blaster.

Per hour:	07/01/2020	07/01/2021
Sewer/Water Laborer:		
GROUP A	$ 31.06	$ 1.25
GROUP B	31.16	1.25
GROUP C	31.21	1.25
GROUP D	31.31	1.25
GROUP E	31.66	1.25
GROUP F	32.06	1.25

For all Deleader & Asbestos work add $1.50 to Group A rate.
For all Hazardous waste work add $2.00 to Group A rate.
An additional $3.00 per hour is required when a single irregular work shift starting any time from 5:00PM to 1:00AM is mandated either in the job specification or by the contracting agency.

SUPPLEMENTAL BENEFITS
Per hour:
$ 26.75

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

Hour terms at the following percentage of Journeyman's wage:

0 to 500	to 1000	to 1500	to 2000	to 2500	to 3000	to 4000
55%	60%	65%	70%	75%	80%	90%

Supplemental benefits per hour:

$ 26.75

3-210h

Laborer - Tunnel — 07/01/2020

JOB DESCRIPTION Laborer - Tunnel **DISTRICT** 3

ENTIRE COUNTIES
Erie

WAGES
CLASS A: Mole Nipper, Powder Handler, Changehouse Attendant and Top Laborer.

CLASS B: Air Spade, Jackhammer, Pavement Breaker.

CLASS C: Top Bell.

CLASS D: Bottom Bell, Side or Roofbelt Driller, Maintenance men, Burners, Block Layers, Rodmen, Caulkers, Miners helper, Trackmen, Nippers, Derailmen, Electrical Cablemen, Hosemen, Groutmen, Gravelmen, Form Workers, Movers and Shaftmen, Conveyor men.

CLASS E: Powder Monkey.

CLASS F: Blasters, Ironmen and Cement Worker, Miner, Welder, Heading Driller.

CLASS G: Steel Erectors, Piledriver, Rigger.

Per hour:	07/01/2020	07/01/2021
Tunnel Laborer:		Additional
CLASS A	$ 32.56	$ 1.25
CLASS B	32.71	1.25
CLASS C	32.81	1.25
CLASS D	33.31	1.25

CLASS E	33.41	1.25
CLASS F	33.81	1.25
CLASS G	33.66	1.25

For all Deleader & Asbestos work add $1.50 to Class A rate.
For all Hazardous waste add $2.00 to Class A rate.
For use of replaceable cartridge respirator add $1.00 to Group A rate.
An additional $3.00 per hour is required when a single irregular work shift starting any time from 5:00PM to 1:00AM is mandated either in the job specification or by the contracting agency.

SUPPLEMENTAL BENEFITS
Per hour:

$ 26.75

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

Hour terms at the following percentage of Journeyman's wage:

0 to 500	to 1000	to 1500	to 2000	to 2500	to 3000	to 4000
55%	60%	65%	70%	75%	80%	90%

Supplemental benefits per hour:

$ 26.75

3-210t

Lineman Electrician — 07/01/2020

JOB DESCRIPTION Lineman Electrician **DISTRICT** 6

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES
Per hour:

NOTE: Includes Teledata Work within ten (10) feet of High Voltage Transmission Lines

Below rates applicable on all overhead and underground distribution and maintenance work, and all overhead and underground transmission line work and the installation of fiber optic cable where no other construction trades are or have been involved. (Ref #14.01.01)

	07/01/2020
Lineman, Technician	$ 53.50
Crane, Crawler Backhoe	53.50
Welder, Cable Splicer	53.50
Digging Mach. Operator	48.15
Tractor Trailer Driver	45.48
Groundman, Truck Driver	42.80
Equipment Mechanic	42.80
Flagman	32.10

Additional $1.00 per hour for entire crew when a helicopter is used.

Below rates applicable on all electrical sub-stations, switching structures, fiber optic cable and all other work not defined as "Utility outside electrical work". (Ref #14.02.01-A)

Lineman, Technician	$ 53.50
Crane, Crawler Backhoe	53.50
Cable Splicer	58.85
Certified Welder - Pipe Type Cable	56.18

Digging Mach. Operator	48.15
Tractor Trailer Driver	45.48
Groundman, Truck Driver	42.80
Equipment Mechanic	42.80
Flagman	32.10

Additional $1.00 per hour for entire crew when a helicopter is used.

Below rates apply on switching structures, maintenance projects, railroad catenary install/maintenance third rail installation, bonding of rails and pipe type cable and installation of fiber optic cable. (Ref #14.02.01-B)

Lineman, Tech, Welder	$ 54.82
Crane, Crawler Backhoe	54.82
Cable Splicer	60.30
Certified Welder -	
Pipe Type Cable	57.56
Digging Mach. Operator	49.34
Tractor Trailer Driver	46.60
Groundman, Truck Driver	43.86
Equipment Mechanic	43.86
Flagman	32.89

Additional $1.00 per hour for entire crew when a helicopter is used.

Below rates applicable on all overhead and underground transmission line work & fiber optic cable where other construction trades are or have been involved. This applies to transmission line work only, not other construction. (Ref #14.03.01)

Lineman, Tech, Welder	$ 56.01
Crane, Crawler Backhoe	56.01
Cable Splicer	56.01
Digging Mach. Operator	50.41
Tractor Trailer Driver	47.61
Groundman, Truck Driver	44.81
Equipment Mechanic	44.81
Flagman	33.61

Additional $1.00 per hour for entire crew when a helicopter is used.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED BETWEEN THE HOURS LISTED BELOW:

1ST SHIFT	8:00 AM to 4:30 PM REGULAR RATE
2ND SHIFT	4:30 PM to 1:00 AM REGULAR RATE PLUS 17.3 %
3RD SHIFT	12:30 AM to 9:00 AM REGULAR RATE PLUS 31.4 %

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day.
NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS
Per hour worked (also required on non-worked holidays):

The following SUPPLEMENTAL BENEFITS apply to all classification categories of CONSTRUCTION, TRANSMISSION and DISTRIBUTION.

Journeyman	$ 24.90 *plus 6.75% of hourly wage

*The 6.75% is based on the hourly wage paid, straight time rate or premium rate.

OVERTIME PAY
See (B, E, Q,) on OVERTIME PAGE. *Note* Double time for all emergency work designated by the Dept. of Jurisdiction.
NOTE: WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid	See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.
Overtime	See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.

NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES

WAGES per hour: 1000 hour terms at the following percentage of the applicable Journeyman Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour: Same as Journeyman

6-1249a

Lineman Electrician - Teledata — 07/01/2020

JOB DESCRIPTION Lineman Electrician - Teledata **DISTRICT** 6

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

Per hour:

For outside work, stopping at first point of attachment (demarcation).

	07/01/2020	01/01/2021
Cable Splicer	$ 33.77	$ 34.78
Installer, Repairman	$ 32.05	$ 33.01
Teledata Lineman	$ 32.05	$ 33.01
Tech., Equip. Operator	$ 32.05	$ 33.01
Groundman	$ 16.99	$ 17.50

NOTE: EXCLUDES Teledata work within ten (10) feet of High Voltage (600 volts and over) transmission lines. For this work please see LINEMAN.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED:

1ST SHIFT	REGULAR RATE
2ND SHIFT	REGULAR RATE PLUS 10%
3RD SHIFT	REGULAR RATE PLUS 15%

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman	$ 5.06 *plus 3% of wage paid	$ 5.06 *plus 3% of wage paid

*The 3% is based on the hourly wage paid, straight time rate or premium rate.

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

NOTE: WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6, 16) on HOLIDAY PAGE

6-1249LT - Teledata

Lineman Electrician - Traffic Signal, Lighting — 07/01/2020

JOB DESCRIPTION Lineman Electrician - Traffic Signal, Lighting **DISTRICT** 6

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Warren, Washington, Wayne, Wyoming, Yates

WAGES

Lineman/Technician shall perform all overhead aerial work. A Lineman/Technician on the ground will install all electrical panels, connect all grounds, install and connect all electrical conductors which includes, but is not limited to road loop wires; conduit and plastic or other type pipes that carry conductors, flex cables and connectors, and to oversee the encasement or burial of such conduits or pipes.

A Groundman/Groundman Truck Driver shall: Build and set concrete forms, handle steel mesh, set footer cages, transport concrete in a wheelbarrow, hand or machine concrete vibrator, finish concrete footers, mix mortar, grout pole bases, cover and maintain footers while curing in cold weather, operate jack hammer, operate hand pavement breaker, tamper, concrete and other motorized saws, as a drill helper, operate and maintain generators, water pumps, chainsaws, sand blasting, operate mulching and seeding machine, air tools, electric tools, gas tools, load and unload materials, hand shovel and/or broom, prepare and pour mastic and other fillers, assist digger operator equipment operator in ground excavation and restoration, landscape work and painting. Only when assisting a lineman technician, a groundman/groundman truck driver may assist in installing conduit, pipe, cables and equipment.

A flagger's duties shall consist of traffic control only.
(Ref #14.01.01)

Per hour:	07/01/2020
Lineman, Technician	$ 46.20
Crane, Crawler Backhoe	46.20
Certified Welder	48.51
Digging Machine	41.58
Tractor Trailer Driver	39.27
Groundman, Truck Driver	36.96
Equipment Mechanic	36.96
Flagman	27.72

Above rates are applicable for installation, testing, operation, maintenance and repair on all Traffic Control (Signal) and Illumination (Lighting) projects, Traffic Monitoring Systems, and Road Weather Information Systems. Includes digging of holes for poles, anchors, footer foundations for electrical equipment; assembly of all electrical materials or raceway; placing of fish wire; pulling of cables, wires or fiber optic cable through such raceways; splicing of conductors; dismantling of such structures, lines or equipment.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED BETWEEN THE HOURS LISTED BELOW:

1ST SHIFT	8:00 AM TO 4:30 PM	REGULAR RATE
2ND SHIFT	4:30 PM TO 1:00 AM	REGULAR RATE PLUS 17.3%
3RD SHIFT	12:30 AM TO 9:00 AM	REGULAR RATE PLUS 31.4%

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day.
NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour worked (but also required on non-worked holidays):

Journeyman	$ 24.90 *plus 6.75% of hourly wage

*The 6.75% is based on the hourly wage paid, straight time rate or premium rate.
Supplements paid at STRAIGHT TIME rate for holidays.

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE. *Note* Double time for all emergency work designated by the Dept. of Jurisdiction.
NOTE: WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid: See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.
Overtime: See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.

NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES
WAGES per hour: 1000 hour terms.

	07/01/2020
1st term	$ 27.72
2nd term	30.03
3rd term	32.34
4th term	34.65
5th term	36.96
6th term	39.27
7th term	41.58

SUPPLEMENTAL BENEFITS per hour: Same as Journeyman

6-1249a-LT

Lineman Electrician - Tree Trimmer — 07/01/2020

JOB DESCRIPTION Lineman Electrician - Tree Trimmer **DISTRICT** 6

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES
Applies to line clearance, tree work and right-of-way preparation on all new or existing energized overhead or underground electrical, telephone and CATV lines. This also would include stump removal near underground energized electrical lines, including telephone and CATV lines.

Per hour:	07/01/2020	01/03/21	01/02/22	01/01/23
Tree Trimmer	$ 26.56	$ 27.36	$ 28.25	$ 29.59
Equipment Operator	23.49	24.19	24.98	26.17
Equipment Mechanic	23.49	24.19	24.98	26.17
Truck Driver	19.56	20.15	20.80	21.79
Groundman	16.11	16.59	17.13	17.94
Flag person	11.61	11.96	12.35	12.94

SUPPLEMENTAL BENEFITS
Per hour worked (but also required on non-worked holidays):

Journeyman	$ 9.98 *plus 3% of hourly wage	$ 9.98 *plus 3% of hourly wage	$ 10.23 *plus 3% of hourly wage	$ 10.48 *plus 3% of hourly wage

* The 3% is based on the hourly wage paid, straight time rate or premium rate.

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE
NOTE: WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY
Paid: See (5, 6, 8, 15, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 16, 25) on HOLIDAY PAGE
NOTE: All paid holidays falling on a Saturday shall be observed on the preceding Friday.
All paid holidays falling on a Sunday shall be observed on the following Monday.

6-1249TT

Mason - Building — 07/01/2020

JOB DESCRIPTION Mason - Building **DISTRICT** 3

ENTIRE COUNTIES
Erie, Niagara

PARTIAL COUNTIES
Cattaraugus: Only the Township of Perrysburg and the Village of Gowanda.

WAGES

Per hour:	07/01/2020
Plasterer	$ 30.15

Additional $3.00/hr for work on swing stage over 20 feet.

SUPPLEMENTAL BENEFITS
Per hour:

$ 21.49

OVERTIME PAY
Exterior work only See (B, E, E2, Q) on OVERTIME PAGE.
All other work See (B, E, Q) on OVERTIME PAGE.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

Hour terms at the following dollar amounts:

0 to 1000	to 2000	to 3000	to 4000	to 4700	to 5400	to 6000	to 7000	to 8000
$ 12.00	$ 14.00	$ 15.00	$ 16.00	$ 17.00	$ 18.00	$ 19.00	$ 20.00	$ 21.00

Supplemental benefits per hour:

Hour terms at the following dollar amounts:

0 to 4000	to 4700	to 5400	to 6000	to 8000
$ 2.50	$ 3.50	$ 4.50	$ 5.50	$ 7.50

3-9-Pltr

Mason - Building — 07/01/2020

JOB DESCRIPTION Mason - Building **DISTRICT** 5

ENTIRE COUNTIES
Erie, Niagara

PARTIAL COUNTIES
Cattaraugus: Only the Township of Perrysburg and the Village of Gowanda.

WAGES

Per Hour:	07/01/2020
Building:	
Bricklayer	$ 31.72
Stone Mason	31.72
Tuck Pointer	31.72

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyman $ 30.11

OVERTIME PAY
See (B,E,E2*,Q) on OVERTIME PAGE
*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

1250 hour terms at the following wage:

1st	2nd	3rd	4th
$ 25.37	$ 25.70	$ 27.42	$ 29.92

Supplemental benefits per hour:

1st	2nd	3rd	4th
$ 11.65	$ 17.52	$ 22.00	$ 25.71

5-3B-Z3

Mason - Building / Heavy&Highway 07/01/2020

JOB DESCRIPTION Mason - Building / Heavy&Highway **DISTRICT** 3

ENTIRE COUNTIES
Erie

PARTIAL COUNTIES
Cattaraugus: Only the Township of Perrysburg and the Village of Gowanda.

WAGES

Per hour:	07/01/2020
Cement Mason	$ 31.00

Additional $0.25 per hr for Swing scaffold or exterior scaffold 42' or higher.
Additional $1.00 per hr when required to wear respirator.

SUPPLEMENTAL BENEFITS
Per hour:
$ 31.92

OVERTIME PAY
See (B, E, Q, V) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

750 hour terms at the following dollar amounts:

1st	2nd	3rd	4th	5th	6th
$ 15.63	$ 17.19	$ 20.25	$ 23.31	$ 26.44	$ 29.56

Supplemental benefits per hour:

1st	2nd	3rd	4th	5th	6th
$ 8.36	$ 11.31	$ 11.19	$ 14.38	$ 16.43	$ 19.66

3-111Erie

Mason - Heavy&Highway 07/01/2020

JOB DESCRIPTION Mason - Heavy&Highway **DISTRICT** 5

ENTIRE COUNTIES
Allegany, Broome, Chautauqua, Chemung, Chenango, Cortland, Delaware, Genesee, Livingston, Monroe, Ontario, Orleans, Otsego, Schuyler, Seneca, Steuben, Tioga, Tompkins, Wayne, Wyoming, Yates

PARTIAL COUNTIES
Cattaraugus: Enitre county except in the Township of Perrysburg and the Village of Gowanda only the Bricklayer classification applies.
Erie: Only the Bricklayer classification applies.
Niagara: Only the Bricklayer classification applies.

WAGES

Per hour:	07/01/2020	07/01/2021
Heavy & Highway:		Additional
Cement Mason	$ 31.58	$ 1.15
Bricklayer	31.58	

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyman $ 22.93

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

1500 hour terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th
50%	60%	70%	80%

Supplemental benefits per hour:

1st term	$ 14.13
2nd - 4th term	22.93

5-3h

Mason - Tile Finisher — 07/01/2020

JOB DESCRIPTION Mason - Tile Finisher **DISTRICT** 5

ENTIRE COUNTIES
Erie, Niagara, Orleans

PARTIAL COUNTIES
Cattaraugus: Only the Township of Perrysburg and the Village of Gowanda.

WAGES
Per hour: 07/01/2020

Building:	
Marble, Slate, Terrazzo and Tile Finisher	$ 29.31

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS
Per hour: $ 16.37

OVERTIME PAY
See (B,E,E2*,Q) on OVERTIME PAGE
*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

1200 hours 1st and 2nd term and 1300 hours 3rd term at the following wage:

1st	2nd	3rd
$ 18.79	$ 21.31	$ 24.13

Supplemental benefits per hour:

1st	2nd	3rd
$ 8.54	$ 10.61	$ 12.37

5-3TF - Z3

Mason - Tile Setter — 07/01/2020

JOB DESCRIPTION Mason - Tile Setter **DISTRICT** 5

ENTIRE COUNTIES
Erie, Niagara, Orleans

PARTIAL COUNTIES

Cattaraugus: Only in the Township of Perrysburg and the Village of Gowanda.

WAGES

Per hour:	07/01/2020
Building:	
Marble, Slate, Terrazzo and Tile Setter	$ 32.25

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour: $ 29.08

OVERTIME PAY

See (B,E,E2*,Q) on OVERTIME PAGE
*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

1250 hour terms at the following wage:

1st	2nd	3rd	4th
$ 25.15	$ 25.43	$ 27.19	$ 30.22

Supplemental benefits per hour:

1st	2nd	3rd	4th
$ 11.57	$ 17.44	$ 21.83	$ 24.96

5-3TS - Z3

Millwright — 07/01/2020

JOB DESCRIPTION Millwright **DISTRICT** 12

ENTIRE COUNTIES
Erie, Genesee, Niagara

WAGES

Per hour:	07/01/2020
Building	$ 33.30
Heavy & Highway*	35.30

*All Heavy & Highway Millwright construction will be paid at the rate indicated above. H/H work performed on hazardous waste sites where employees are required to wear protective gear shall receive an additional $2.00 per hour over the Millwright H/H rate for all hours worked on the day protective gear was worn.

NOTE ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount subject to any overtime premiums):
- Certified Welders shall receive $1.75 per hour in addition to the current Millwright's rate provided he/she is directed to perform certified welding.
- If a work site has been declared a hazardous site by the Owner and the use of protective gear (including, as a minimum, air purifying canister-type chemical respirators) are required, then that employee shall receive a $1.50 premium per hour.
- An employee performing the work of a machinist shall receive $2.00 per hour in addition to the current Building Millwright's rate. For the purposes of this premium to apply, a "machinist" is a person who uses a lathe, Bridgeport, milling machine or similar type of tool to make or modify parts.
- When performing work underground at 500 feet and below, the employee shall receive an additional $0.50 per hour. This amount will increase to $1.00 on 7/1/2020.

SUPPLEMENTAL BENEFITS

Per hour Paid:

All Classifications	$29.85

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

1300 hour terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th
60%	70%	80%	90%

Supplemental Benefits per hour worked:

1st	2nd	3rd	4th
$11.80	$ 24.48	$ 26.27	$ 28.06

12-1163-Gen/Nia/Orl/Wyo

Operating Engineer - Building 07/01/2020

JOB DESCRIPTION Operating Engineer - Building **DISTRICT** 12

ENTIRE COUNTIES
Cattaraugus, Chautauqua, Erie, Orleans, Wyoming

PARTIAL COUNTIES
Genesee: Only that portion of the county that lies west of a line down the center of Route 98 excluding that area that lies within the City of Batavia.

WAGES
CLASS A: Air Hoist, All Boom Type Equipment, All Pans and Carry-Alls, Archer Hoist, Asphalt Curb and Gutter Machines, Asphalt Roller, Asphalt Spreader or Paver, Automatic Fine Grade Machine (CMI or similar, first and second operator), Backhoe and Pullhoe, Backhoe and Pullhoe (tractor mounted, rubber tired), Back Filling Machine, Belt Placer (CMI or similar type), Bending Machine (Pipe), Bituminous Spreader and Mixer, Blacktop Plants (Automated and Non-automated), Blast or Rotary Drill (Truck or Track Mounted), Blower for Burning Brush, Boiler (when used for power), Boom Truck (excluding pick-up and delivery), Boring Machine, Bulldozer, Cableway, Cage Hoist, Caisson Auger, Central Mix Plant (and all concrete batching plants), Cherry Picker, Concrete Cleaning Decontamination Machine Operator, Concrete Curb and Gutter Machine, Concrete Curing Machine, Concrete Cutters (Vermeer or Similar Type), Concrete Mixer (over 1/2 cu yd.), Concrete Pavement Spreaders and Finishers, Concrete Paver, Concrete Pump, Conveyor, Core Drill, Crane, Crusher, Decon of Equipment, Derrick, Dragline, Dredge, Drill Rig (Tractor Mounted), Dual Drum Paver, Electric Pump used in conjunction with Well Point Systems, Elevating Grader (self propelled or towed), Elevator, Excavator (all purpose, hydraulically operated), Farm Tractor with Accessories, Fine Grade Machine, Forklift, Front End Loader, Generator (10 outlets or more), Gradall, Grader, Grout or Gunite Machine, Head Tower, Heavy Equipment Robotics Operator/Mechanic, Helicopter (when used for hoisting), Hoist (one drum), Hoisting Engine, Horizontal Directional Drill Locator, Horizontal Directional Drill Operator, Hydraulic Boom, Hydraulic Hammer (self-propelled), Hydraulic Pipe Jack Machine (or similar type machine), Hydraulic Rock Expander (or similar type machine), Hydraulic System Pumps, Hydro Crane, Hydro Hammer (or similar type), Industrial Tractor, Jersey Spreader, Kolman Plant Loader (and similar type loaders), Laser Screed, Locomotive, Lubrication Truck, Maintenance Engineer, Maintenance, Lubrication Unit or Truck, Mine Hoist, Mixer for Stabilized Base (self-propelled), Monorail, Motorized Hydraulic Pin Puller, Motorized Hydraulic Seeder, Mucking Machine, Mulching Machine, Multiple Drum Hoist (more than one drum in use), Overhead Crane, Peine Crane (or similar type), Pile Driver, Plant Engineer, Pneumatic Mixer, Post Hole Digger and Driver, Power Broom, Pump Crete, Push Button Hoist, Push or Snatch Cat, Quarry Master or equivalent, Road Widener, Rock Bit Sharpener (all types), Roller (all), Rolling Machine (pipe), Rotomill, Scissors Trucks, Lift, or Boom Lift of any type (when used for hoisting), Scoopmobile, Shovel, SideBoom, Skidsteer/Bobcat (Similar Type), Skimmer, Slip Form Paver (CMI or similar type), Snorkel/Vacuum Truck, Strato-Tower, Stump Chipping Machine, Tire Truck and Drivers performing tire repair (exclude outside vendor), Towed Roller, Tractor Drawn Belt-Type Grader/Loader, Tractor Shovel, Tractor with Towed Accessories, Tractor (when using winch power), Tractors, Trencher, Truck Crane, Truck Mechanic and Helper (exclude Teamsters when repairing their own trucks), Tunnel Shovel, Tube Finisher (CMI and similar type), Ultra High Pressure Waterjet Cutting Tool System Operator/Mechanic, Vacuum Blasting Machine Operator/Mechanic, Vibratory Compactor, Vibro Tamp, Well Drilling Machine, Well Point, Winch, Winch Truck with A Frame.

CLASS B: Aggregate Bin, Aggregate Plant, Apprentice Engineer, Apprentice Engineer Driver, Articulated Off Road Material Hauler, Boiler (used in conjunction with production), CMI and similar type Concrete Spreads (Apprentice Engineer), Cement Bin, Chipping Machine and Chip Spreader, Compressors (4 or less), Compressors (any size, but subject to other provisions for Compressors, Dust Collectors, Generators, Mechanical Heaters, Pumps, Welding Machines - four of any type or combination), Concrete Mixer (1/2 cu. yd. and under), Fireman, Form Tamper, Form Trucks (excluding Teamster or delivery), Fuel Truck or Drivers (exclude Teamster or delivery), Heaters, Heating Boiler (used for temporary heat), Helper on Lubrication Unit or Truck, Jeep Trencher, Power Heaterman, Power Plant in excess of 10 K.W., Pumps, Revinius Widener, Steam Boilers (if manning or license by local law is required), Steam Cleaner (when used for cleaning equipment on the job site), Welding Machine (1 machine over 300 amps or 2 or 3 machines regardless of amps).

Operating Engineer- Building:

Per hour:	07/01/2020
Class A	$ 37.86

Class B	33.38
Crane(Up to 60 Tons)	40.86
" (61 to 199 Tons)	41.36
" (200 to 399 Tons)	41.86
" (400 Tons or more)	42.36

Additional $5.00/hr. for Any Tower Crane
Additional $2.50/hr. for Hazardous Work Site
Additional $1.00/hr. for Tunnel Work

SUPPLEMENTAL BENEFITS
Per Hour:

Journeyman $ 30.70**

**Note: For Overtime Hours $22.50 of this amount is paid a straight time, the remaining balance of $8.20 is paid at the same premium as the wage.

OVERTIME PAY
See (B, E, *E2, P, **V) on OVERTIME PAGE
* Only Saturdays between October 15th and April 15th.

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:
1 year Terms

1st	2nd	3rd	4th
$27.70	$28.59	$29.47	$30.31

Supplemental benefits Per Hour:
All Apprentices $29.80**

**Note: For Overtime Hours $22.50 of this amount to be paid a straight time rate remaining balance of $7.30 is paid at same premium as the wage.

12-17b

Operating Engineer - Heavy&Highway 07/01/2020

JOB DESCRIPTION Operating Engineer - Heavy&Highway **DISTRICT** 12

ENTIRE COUNTIES
Cattaraugus, Chautauqua, Erie, Orleans, Wyoming

PARTIAL COUNTIES
Genesee: Only that portion of the county that lies west of a line down the center of Route 98 excluding that area that lies within the City of Batavia.

WAGES

CLASS A: Air Hoist, All Boom Type Equipment, All Pans and Carry-Alls, Asphalt Curb and Cutter Machines, Asphalt Roller, Asphalt Spreader or Paver, Automatic Fine Grade Machine (CMI or similar, first and second operator), Backhoe and Pullhoe (all), Back Filling Machine, Belt Placer (CMI or similar type), Bending Machine (pipe), Bituminous Spreader and Mixer, Blacktop Plant (all), Blast or Rotary Drill (Truck or Track Mounted), Blower for Burning Brush, Boiler (when used for power), Boom Truck, Boring Machine, Bulldozer, Cableway, Cage Hoist, Caisson Auger, Central Mix Plant (and all Concrete Batching Plants), Cherry Picker, Concrete Cleaning Decontamination Machine, Concrete Curb and Gutter Machine, Concrete Curing Machine, Concrete Mixer (over 1/2 cu. yd.), Concrete Pavement Spreaders and Finishers, Concrete Paver, Concrete Pump, Concrete Saw (self propelled), Conveyor, Convoying Vehicles Convoying Engineer's Equipment, Core Drill, Crane, Crusher, Decontamination of Equipment, Derrick, Dragline, Dredge, Drill Rig (Tractor Mounted), Dual Drum Paver, Electric Pump used in conjunction with Well Point Systems, Elevating Grader (self propelled or towed), Elevator, Excavator (all purpose, hydraulically operated), Farm Tractor with Accessories, Fine Grade Machine, Forklift, Front End Loader, Gradall, Grader, Grout or Gunite Machine, Head Tower, Heavy Equipment Robotics Operator/Mechanic, Hoist (all types), Hoisting Engine, Horizontal Directional Drill Locator, Horizontal Directional Drill Operator, Hydraulic Boom, Hydraulic Hammer (self propelled), Hydraulic Pipe Jack Machine, (or similar type machine), Hydraulic Rock Expander (or similar type machine), Hydraulic System Pumps, Industrial Tractor, Jersey Spreader, Kolman Plant Loader (and similar type Loaders), Laser Screed, Locomotive, Log Skidder (similar type), Maintenance Engineer, Maintenance, Lubrication Unit or Truck, Mine Hoist, Mixer for Stabilized Base (self propelled), Monorail, Motorized Hydraulic Pin Puller, Motorized Hydraulic Seeder, Mucking Machine, Mulching Machine, Overhead Crane, Parts Chasing, Peine Crane (or similar type), Pile Driver, Plant Engineer, Pneumatic Mixer, Post Hole Digger and Post Driver, Power Broom, Pump Crete, Push Button Hoist, Push or Snatch Cat, Quarry Master (or equivalent), Road Widener, Rock Bit Sharpener (all types), Roller (all), Rolling Machine (Pipe), Rotomill, Scoopmobile, Shovel, Side Boom, Skidsteer/Bobcat (similar type), Skimmer, Slip Form Paver (CMI or similar, first and second operator), Snorkel/Vacuum Truck, Strato-Tower, Tire Truck & Repair, Towed Roller, Tractor Drawn Belt-Type Grader/Loader, Tractor Shovel, Tractor with Towed Accessories, Tractors (when using winch power), Trencher, Truck Crane, Tug Boats, Tunnel Shovel, Tube Finisher (CMI and similar), Vacuum Blasting Machine Operator/Mechanic, Vibratory Compactor, Vibro Tamp, Waterjet Cutting Tool System Operator/Mechanic (Ultra High Pressure), Well Drilling Machine, Well Point, Winch, Winch Truck with A Frame.

CLASS B: Aggregate Bin, Aggregate Plant, Apprentice Engineer, Apprentice Engineer Driver, Articulated Off Road Material Hauler, CMI and similar type Concrete Spreads (Apprentice Engineer), Cement Bin, Chipping Machine and Chip Spreader, Compressors (4 or less), Compressors: any size, but subject to other provisions for Compressors, Dust Collectors, Generators, Mechanical Heaters, Pumps, Welding Machines (four of any type or combination), Concrete Mixer (1/2 cu. yd. and under), Fireman, Form Tamper, Fuel Truck, Heating Boiler (used for temporary heat), Helper on Lubrication Unit or Truck, Jeep Trencher, Power Heaterman, Power Plant in excess of 10 K.W., Pumps (4" or over), Revinius Widener, Steam Cleaner, Stump Chipping Machine, Welding Machine (1 machine over 300 amps or 2 or 3 machines regardless of amps).

Operating Engineer- Heavy/Highway, Sewer/Water, Tunnel:

Per hour:	07/01/2020
Class A	$ 38.89
Class B	35.39
Crane(boom over 100ft)	40.64
" (boom over 200ft)	40.89
" (boom over 300ft)	41.39

Additional $3.00/hr. for Lattice Boom
Additional $3.00/hr. for Hydraulic Crane over 60 tons
Additional $2.50/hr. for Hazardous Work Site
Additional $1.00/hr. for Tunnel Work
Additional $3.00/hr. for Mandated Off-Shift Work

SUPPLEMENTAL BENEFITS
Per hour:

Journeymen	$ 32.01*

*Note: For Overtime Hours $24.31 of the amount paid at straight time, the remaining balance of $7.70 is paid at the same premium as the wage.

OVERTIME PAY
See (B, E, Q, T, *V) on OVERTIME PAGE

HOLIDAY
Paid: See (*5, **6) on HOLIDAY PAGE
Overtime: See (***5, ****6) on HOLIDAY PAGE
*,** NOTE: If Holiday falls on a Sunday it will be celebrated on Monday
,* NOTE: If employee works that Monday use "T" under Overtime Pay.

REGISTERED APPRENTICES
Wages per hour:
Apprentices at 1 year terms

1st	2nd	3rd	4th
$32.39	$33.39	$34.39	$35.39

Supplemental Benefits

All Apprentices $31.61*

Note: For Overtime Hours $24.31 of this amount is paid at straight time , the remaining balance of $7.30 is paid at the same premium as the wage.

12-17 hh/sw/t

Operating Engineer - Marine Dredging 07/01/2020

JOB DESCRIPTION Operating Engineer - Marine Dredging **DISTRICT** 4

ENTIRE COUNTIES
Albany, Bronx, Cayuga, Chautauqua, Clinton, Columbia, Dutchess, Erie, Essex, Franklin, Greene, Jefferson, Kings, Monroe, Nassau, New York, Niagara, Orange, Orleans, Oswego, Putnam, Queens, Rensselaer, Richmond, Rockland, St. Lawrence, Suffolk, Ulster, Washington, Wayne, Westchester

WAGES
These wages do not apply to Operating Engineers on land based construction projects. For those projects, please see the Operating Engineer Heavy/Highway Rates. The wage rates below for all equipment and operators are only for marine dredging work in navigable waters found in the counties listed above.

Per Hour:	07/01/2020	10/01/2020
CLASS A1 Deck Captain, Leverman Mechanical Dredge Operator Licensed Tug Operator 1000HP or more.	$ 40.31	$ 41.42
CLASS A2 Crane Operator (360 swing)	35.92	36.91
CLASS B Dozer,Front Loader Operator on Land	To conform to Operating Engineer Prevailing Wage in locality where work is being performed including benefits.	
CLASS B1 Derrick Operator (180 swing) Spider/Spill Barge Operator Operator II, Fill Placer, Engineer, Chief Mate, Electrician, Chief Welder, Maintenance Engineer Licensed Boat, Crew Boat Operator	34.86	35.82
CLASS B2 Certified Welder	32.82	33.72
CLASS C1 Drag Barge Operator, Steward, Mate, Assistant Fill Placer	31.92	32.80
CLASS C2 Boat Operator	30.89	31.74
CLASS D Shoreman, Deckhand, Oiler, Rodman, Scowman, Cook, Messman, Porter/Janitor	25.66	26.37

SUPPLEMENTAL BENEFITS
Per Hour:
THE FOLLOWING SUPPLEMENTAL BENEFITS APPLY TO ALL CATEGORIES

	07/01/2020	10/01/2020
All Classes A & B	$11.58 plus 7.5% of straight time wage, Overtime hours	$11.98 plus 8% of straight time wage, Overtime hours

	add $ 0.63	add $ 0.63
All Class C	$11.28 plus 7.5% of straight time wage, Overtime hours add $ 0.48	11.68 plus 8% of straight time wage, Overtime hours add $ 0.48
All Class D	$10.98 plus 7.5% of straight time wage, Overtime hours add $ 0.33	11.38 plus 8% of straight time wage, Overtime hours add $ 0.33

OVERTIME PAY
See (B2, F, R) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 26) on HOLIDAY PAGE

4-25a-MarDredge

Operating Engineer - Survey Crew — 07/01/2020

JOB DESCRIPTION Operating Engineer - Survey Crew **DISTRICT** 12

ENTIRE COUNTIES
Cattaraugus, Chautauqua, Erie, Orleans, Wyoming

PARTIAL COUNTIES
Genesee: Only that portion of the county that lies west of a line down the center of Route 98 excluding that area that lies within the City of Batavia.

WAGES
These rates apply to Building and Heavy Highway.

Per hour:
SURVEY CLASSIFICATIONS:

Party Chief - One who directs a survey party.
Instrument Person - One who operates the surveying instruments.
Rod Person - One who holds the rods and assists the Instrument Person.

	07/01/2020
Party Chief	$ 42.64
Instrument Person	40.20
Rod Person	27.78

Additional $3.00 per hr. for work in a Tunnel.
Additional $2.50 per hr. for EPA or DEC certified toxic or hazardous waste work.

SUPPLEMENTAL BENEFITS
Per hour worked:

Journeyman	$ 27.80

OVERTIME PAY
See (B, E, P, T) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
WAGES:1000 hour terms based on the Percentage of Rod Person wage:

	07/01/2020
0-1000 Hrs	60%
1001-2000 Hrs	70%
2001-3000 Hrs	80%

SUPPLEMENTAL BENEFITS per hour worked:

0-1000 Hrs	$ 16.62
1001-2000 Hrs	19.40
2001-3000 Hrs	22.17

12-17D Sur

Operating Engineer - Survey Crew - Consulting Engineer 07/01/2020

JOB DESCRIPTION Operating Engineer - Survey Crew - Consulting Engineer **DISTRICT** 12

ENTIRE COUNTIES
Cattaraugus, Chautauqua, Erie, Orleans, Wyoming

PARTIAL COUNTIES
Genesee: Only that portion of the county that lies west of a line down the center of Route 98 excluding that area that lies within the City of Batavia.

WAGES
These rates apply to feasibility and preliminary design surveying, line of grade surveying for inspection or supervision of construction when performed under a Consulting Engineer Agreement.

Per hour:
SURVEY CLASSIFICATIONS:

Party Chief - One who directs a survey party.
Instrument Person - One who operates the surveying instruments.
Rod Person - One who holds the rods and assists the Instrument Person.

	07/01/2020
Party Chief	$ 42.64
Instrument Person	40.20
Rod Person	27.78

SUPPLEMENTAL BENEFITS
Per hour worked:

Journeyman	$ 27.80

OVERTIME PAY
See (B, E, P, T) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
WAGES: 1000 hour terms based on the Percentage of Rod Persons Wage:

	07/01/2020
0-1000	60%
1001-2000	70%
2001-3000	80%

SUPPLEMENTAL BENEFITS per hour worked:

0-1000	$ 16.62
1001-2000	19.40
2001-3000	22.17

12-17D Con Eng

Painter 07/01/2020

JOB DESCRIPTION Painter **DISTRICT** 3

ENTIRE COUNTIES
Allegany, Erie, Genesee, Niagara, Orleans, Wyoming

PARTIAL COUNTIES
Cattaraugus: Entire County except the Townships of Conewango, Leon, Napoli, New Albion, Randolph and South Valley.
Chautauqua: Only the Townships of Awkright, Dunkirk, Hanover, Pomfret, Portland, Sheridan and Villenova.
Livingston: Only the Townships of North Dansville, Nunda, Ossian,Portage, Sparta, Spring Water and West Sparta.
Steuben: Only the Townships of Avoca, Canisteo, Cohocton, Dansville,Fremont, Greenwood, Hartsville, Hornellsville, Howard, Jasper, Prattsburg, Pulteney, Troupsburg, Tuscarora, Urbana, Wayland, Wayne, Woodhull, West Union, Wheeler, and the City of Hornell.

WAGES

Per hour:	07/01/2020	05/01/2021 Additional
Basic Rate (Brush & Roll)	$ 27.25	$ 1.00
Spray painting, wallcovering	27.25	1.00
Abrasive and hydroblasting	27.25	1.00
Taping/DryWall Finisher	27.75	1.00
Skeleton Steel*	28.00	1.00

* Skeleton Steel: No floors, walls or ceiling are constructed, including radio and television towers, flagpoles, smokestacks, cranes and the abatement of coatings with lead, asbestos and/or arsenic, etc. All work within the confines of a plant shall be paid the skeleton steel rate (except in-plant tank work (see Tank Rate)).

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS
Per hour:

$ 25.54

OVERTIME PAY
Exterior work only See (B, E4, F*, R) on OVERTIME PAGE.
All other work See (B, F*, R) on OVERTIME PAGE.
* Note - Saturday is payable at straight time if the employee misses work, except where a doctor's or hospital verification of illness is produced Monday through Friday when work was available to the employee.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

Painter/Decorator: 750 hour terms at the following percentage of Journeyman's Basic wage rate:

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	90%

Taper/Drywall Finisher: 750 hour terms at the following percentage of Journeyman's Taper wage:

1st	2nd	3rd	4th	5th	6th
50%	55%	60%	65%	75%	85%

Supplemental benefits per hour:

Painter/Decorator and Taper/Drywall Finisher:

1st	2nd	3rd	4th	5th	6th	7th	8th
$ 2.35	$ 4.35	$ 5.35	$ 5.85	$ 6.35	$ 6.85	$ 7.35	$ 7.60

3-4-Buf, Nia, Olean

Painter — 07/01/2020

JOB DESCRIPTION Painter **DISTRICT** 3

ENTIRE COUNTIES
Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Cortland, Delaware, Erie, Genesee, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Wayne, Wyoming, Yates

WAGES

Per hour:	07/01/2020	05/01/2021 Additional
Bridge	$ 39.20	$ 1.00
Tunnel	39.20	1.00
Tank*	37.20	1.00

For Bridge Painting Contracts, ALL WORKERS on and off the bridge (including Flagmen) are to be paid Painter's Rate; the contract must be ONLY for Bridge Painting.

Tank rate applies to indoor and outdoor tanks, tank towers, standpipes, digesters, waste water treatment tanks, chlorinator tanks, etc. Covers all types of tanks including but not limited to steel tanks, concrete tanks, fiberglass tanks, etc.

Note an additional $1.00 per hour is required when the contracting agency or project specification requires any shift to start prior to 6:00am or after 12:00 noon.

SUPPLEMENTAL BENEFITS
Per hour:
$ 29.00

OVERTIME PAY
Exterior work only See (B, E4, F*, R) on OVERTIME PAGE.
All other work See (B, F*, R) on OVERTIME PAGE.
*Note - Saturday is payable at straight time if the employee misses work, except where a doctor's or hospital verification of illness is produced Monday through Friday when work was available to the employee.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

750 hour terms at the following percentage of Journeyman's wage rate:

1st	2nd	3rd	4th	5th	6th
50%	55%	60%	65%	75%	85%

Supplemental benefits per hour:

1st & 2nd terms	$ 5.50
3rd & 4th terms	5.50
5th & 6th terms	6.50

3-4-Bridge, Tunnel, Tank

Painter - Metal Polisher — 07/01/2020

JOB DESCRIPTION Painter - Metal Polisher **DISTRICT** 8

ENTIRE COUNTIES
Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

	07/01/2020
Metal Polisher	$ 36.33
Metal Polisher*	37.43
Metal Polisher**	40.33

*Note: Applies on New Construction & complete renovation
** Note: Applies when working on scaffolds over 34 feet.

SUPPLEMENTAL BENEFITS
Per Hour: 07/01/2020

Journeyworker:
All classification $ 9.94

OVERTIME PAY
See (B, E, P, T) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 6, 9, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:
One (1) year term at the following wage rates:

	07/01/2020
1st year	$ 16.00
2nd year	17.00
3rd year	18.00

1st year*	$ 16.39
2nd year*	17.44
3rd year*	18.54
1st year**	$ 18.50
2nd year**	19.50
3rd year**	20.50

*Note: Applies on New Construction & complete renovation
** Note: Applies when working on scaffolds over 34 feet.

Supplemental benefits:
Per hour:

1st year	$ 6.69
2nd year	6.69
3rd year	6.69

8-8A/28A-MP

Plumber — 07/01/2020

JOB DESCRIPTION Plumber **DISTRICT** 3

ENTIRE COUNTIES
Erie, Niagara, Wyoming

PARTIAL COUNTIES
Allegany: Only the Townships of Allen, Angelica, Belfast, Caneadea, Centerville, Granger, Hume, New Hudson and Rushford
Cattaraugus: Only the Townships of Ashford, Dayton, East Otto, Ellicottville, Farmersville, Franklinville, Freedom, Leon, Lyndon, Machias, Mansfield, New Albion, Otto, Perrysburg, Persia and Yorkshire.
Chautauqua: Only the Townships of Arkwright, Charlotte, Cherry Creek, Dunkirk, Hanover, Pomfret, Portland, Ripley, Sheridan, Stockton, Villenova, Westfield, City of Dunkirk and Village of Fredonia.
Genesee: Only the Townships of Alabama, Alexander, Batavia, Darien, Elba, Oakfield, Pembroke and the City of Batavia.
Orleans: Only the Townships of Ridgeway, Shelby and Yates.

WAGES
Per hour: 07/01/2020

Plumber	$ 36.63
Steamfitter	$ 36.63

Note - Add 10% (ten-percent) to wage when HAZMAT training is required or when OSHA compliant respirator protection is required.

SUPPLEMENTAL BENEFITS
Per hour:

$ 26.43

Note - $3.60 of this amount must be paid at the same premium as the wage.

OVERTIME PAY
See (*B, **E, Q) on OVERTIME PAGE
* Double time after 11 hours per day on Weekdays.
** Double time after 10 hours per day on Saturday.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

One year terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th	5th
45%	55%	65%	75%	90%

Note - Add 10% (ten-percent) to wage when HAZMAT training is required or when OSHA compliant respirator protection is required.

Supplemental benefits per hour:

$ 21.80

Note - $3.60 of this amount must be paid at the same premium as the wage.

3-22-Buffalo, Niagara

Roofer — 07/01/2020

JOB DESCRIPTION Roofer **DISTRICT** 3

ENTIRE COUNTIES
Erie, Genesee, Niagara, Orleans, Wyoming

WAGES

Per hour:	07/01/2020	06/01/2021 Additional
Asbestos Removal	$ 32.96	$ 1.00
Slate, Tile	30.11	1.00
Precast tile / slabs	30.11	1.00
Crete / gypsum planks	30.11	1.00
Damp and waterproofer	29.96	1.00
Composition, spayers,	29.96	1.00
Aspalt mastic,	29.96	1.00
Steep roofers	29.96	1.00

When shift work is mandated either in the job specification or by the contracting agency the following premiums apply:
15.0% for work from 4:30PM - 1:00AM or second shift
20.0% for work from 12:30AM - 9:00AM or third shift

SUPPLEMENTAL BENEFITS
Per hour:
$ 23.01

OVERTIME PAY
See (B, *E, **E2, Q) on OVERTIME PAGE
* and ** Double time after 8 hours on Saturday.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

Hour terms at the following percentage of Journeyman's wage:

0 to 499	to 999	to 1499	to 1999	to 2499	to 2999	to 3499	to 4499
60%	65%	70%	75%	80%	85%	90%	95%

Supplemental benefits per hour:

0 to 499	to 999	to 1499	to 1999	to 2499	to 2999	to 3499	to 4499
$ 8.21	$ 8.21	$ 12.34	$ 12.54	$ 20.32	$ 20.99	$ 21.66	$ 22.34

3-74

Sheetmetal Worker — 07/01/2020

JOB DESCRIPTION Sheetmetal Worker **DISTRICT** 3

ENTIRE COUNTIES
Erie, Genesee, Niagara, Orleans, Wyoming

WAGES

Per hour:	07/01/2020	06/01/2021 Additional
Sheet Metal Worker	$ 35.00	$ 1.25

Additional $0.50 per hour for work more than 30'' above floor on boatswain chair.
Additional $1.00 per hour for work in "Hot" areas of atomic laboratories, atomic plants, or any premises where radio-active materials are stored or handled and personal protective equipment is required.
Additional $1.00 per hour for work when required to have 40-hour HAZMAT training or the use of OSHA compliant respirator is required.

When shift work is mandated either in the job specification or by the contracting agency the following premiums apply:
Shift Premium per hour:

Second Shift	$ 3.25
Third Shift	$ 5.00

SUPPLEMENTAL BENEFITS
Per hour:
$ 26.22*
* Note - $16.52 of this amount must be paid at the same premium as the wages per overtime hours.

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:
One year terms at the following wage:

1st term	$ 15.75
2nd term	20.50
3rd term	21.95
4th term	26.30
5th term	29.20

Supplemental benefits per hour:

1st term	$ 15.59	Note - $7.89 of this amount must be paid at the same premium as the wage.
2nd term	18.59	Note - $10.89 of this amount must be paid at the same premium as the wage.
3rd term	23.52	Note - $13.79 of this amount must be paid at the same premium as the wage.
4th term	24.42	Note - $14.72 of this amount must be paid at the same premium as the wage.
5th term	25.02	Note - $15.32 of this amount must be paid at the same premium as the wage.

When shift work is mandated either in the job specification or by the contracting agency the following premiums apply;
Shift Premium per hour:

Second Shift

1st term	$ 1.46
2nd term	$ 1.63
3rd term	$ 1.79
4th term	$ 2.28
5th term	$ 2.60

Third Shift

1st term	$ 2.25
2nd term	$ 2.50
3rd term	$ 2.75
4th term	$ 3.50
5th term	$ 4.00

Sprinkler Fitter — 07/01/2020

JOB DESCRIPTION Sprinkler Fitter **DISTRICT** 1

ENTIRE COUNTIES
Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Washington, Wayne, Wyoming, Yates

WAGES

Per hour	07/01/2020
Sprinkler Fitter	$ 35.01

SUPPLEMENTAL BENEFITS
Per hour

Journeyperson	$ 26.62

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: When a holiday falls on Sunday, the following Monday shall be considered a holiday and all work performed on either day shall be at the double time rate. When a holiday falls on Saturday, the preceding Friday shall be considered a holiday and all work performed on either day shall be at the double time rate.

REGISTERED APPRENTICES
Wages per hour

One Half Year terms at the following percentage of journeyperson's wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
45%	50%	55%	60%	65%	70%	75%	80%	85%	90%

Supplemental Benefits per hour

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
$ 8.27	$ 8.27	$ 18.70	$ 18.70	$ 18.95	$ 18.95	$ 18.95	$ 18.95	$ 18.95	$ 18.95

1-669

Teamster - Building / Heavy&Highway **07/01/2020**

JOB DESCRIPTION Teamster - Building / Heavy&Highway **DISTRICT** 3

ENTIRE COUNTIES
Erie, Niagara

PARTIAL COUNTIES
Genesee: Only in the Townships of Alabama, Darien and Pembroke.
Orleans: Only the Townships of Ridgeway, Shelby and Yates.
Wyoming: Only in the Townships of Arcade, Bennington, Java and Sheldon.

WAGES
GROUP 1: Warehousemen, Yardmen, Truck Helpers, Pickups, Panel Trucks, Flatboy Material Trucks (straight jobs), Single Axle Dump Trucks, Dumpsters, Material Checkers and Receivers, Greasers, Truck Tiremen, Mechanics Helpers and Parts Chasers.

GROUP 2: Tandems and Batch Trucks, Mechanics, Dispatcher.

GROUP 3: Semi-Trailers, Low-Boy Trucks, Asphalt Distributor Trucks and Agitator, Mixer Trucks and dumpcrete type vehicles, Truck Mechanic, Fuel Trucks

GROUP 4: Specialized Earth Moving Equipment, Euclid type, or similar off-highway, where not self-loading, Straddle (Ross) Carrier, and self -contained concrete mobile truck.

GROUP 5: Off-highway Tandem Back-Dump, Twin Engine Equipment and Double-Hitched Equipment where not self-loading.

Per hour:	07/01/2020
All GROUPS	$ 39.72

Add $2.00 when required to use personal protection when performing hazardous waste removal work.
An additional $3.00 per hour is required when a single irregular work shift starting any time from 5:00PM to 1:00AM is mandated either in the job specification or by the contracting agency.

SUPPLEMENTAL BENEFITS
Per hour:
$ 14.68*
*Note - Only $ 6.79 per hour needs to be paid for overtime hours.

OVERTIME PAY
See (B, G, P) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

3-449

Teamster - Building / Heavy&Highway **07/01/2020**

JOB DESCRIPTION Teamster - Building / Heavy&Highway **DISTRICT** 3

ENTIRE COUNTIES
Erie, Niagara

WAGES

Per hour:	07/01/2020
Dump Truck Operator*	$ 23.25

*Does not include Single Axle Dump Trucks (see Teamster Group 1).
*Does not include Off-highway Dump Trucks (see Teamster Groups 2-5).

SUPPLEMENTAL BENEFITS
Per hour:

$ 1.59

OVERTIME PAY
See (B, B2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

3-449d-DT

Welder 07/01/2020

JOB DESCRIPTION Welder **DISTRICT** 1

ENTIRE COUNTIES
Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES
Per hour 07/01/2020

Welder: To be paid the same rate of the mechanic performing the work.*

*EXCEPTION: If a specific welder certification is required, then the 'Certified Welder' rate in that trade tag will be paid.

OVERTIME PAY

HOLIDAY

1-As Per Trade

Overtime Codes

Following is an explanation of the code(s) listed in the OVERTIME section of each classification contained in the attached schedule. Additional requirements may also be listed in the HOLIDAY section.

NOTE: Supplemental Benefits are 'Per hour worked' (for each hour worked) unless otherwise noted

(AA)	Time and one half of the hourly rate after 7 and one half hours per day
(A)	Time and one half of the hourly rate after 7 hours per day
(B)	Time and one half of the hourly rate after 8 hours per day
(B1)	Time and one half of the hourly rate for the 9th & 10th hours week days and the 1st 8 hours on Saturday. Double the hourly rate for all additional hours
(B2)	Time and one half of the hourly rate after 40 hours per week
(C)	Double the hourly rate after 7 hours per day
(C1)	Double the hourly rate after 7 and one half hours per day
(D)	Double the hourly rate after 8 hours per day
(D1)	Double the hourly rate after 9 hours per day
(E)	Time and one half of the hourly rate on Saturday
(E1)	Time and one half 1st 4 hours on Saturday; Double the hourly rate all additional Saturday hours
(E2)	Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
(E3)	Between November 1st and March 3rd Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather, provided a given employee has worked between 16 and 32 hours that week
(E4)	Saturday and Sunday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
(E5)	Double time after 8 hours on Saturdays
(F)	Time and one half of the hourly rate on Saturday and Sunday
(G)	Time and one half of the hourly rate on Saturday and Holidays
(H)	Time and one half of the hourly rate on Saturday, Sunday, and Holidays
(I)	Time and one half of the hourly rate on Sunday
(J)	Time and one half of the hourly rate on Sunday and Holidays
(K)	Time and one half of the hourly rate on Holidays
(L)	Double the hourly rate on Saturday
(M)	Double the hourly rate on Saturday and Sunday
(N)	Double the hourly rate on Saturday and Holidays
(O)	Double the hourly rate on Saturday, Sunday, and Holidays
(P)	Double the hourly rate on Sunday
(Q)	Double the hourly rate on Sunday and Holidays
(R)	Double the hourly rate on Holidays
(S)	Two and one half times the hourly rate for Holidays

(S1) Two and one half times the hourly rate the first 8 hours on Sunday or Holidays One and one half times the hourly rate all additional hours.

(T) Triple the hourly rate for Holidays

(U) Four times the hourly rate for Holidays

(V) Including benefits at SAME PREMIUM as shown for overtime

(W) Time and one half for benefits on all overtime hours.

(X) Benefits payable on Paid Holiday at straight time. If worked, additional benefit amount will be required for worked hours. (Refer to other codes listed.)

Holiday Codes

PAID Holidays:

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

OVERTIME Holiday Pay:

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays. The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Following is an explanation of the code(s) listed in the HOLIDAY section of each classification contained in the attached schedule. The Holidays as listed below are to be paid at the wage rates at which the employee is normally classified.

(1)	None
(2)	Labor Day
(3)	Memorial Day and Labor Day
(4)	Memorial Day and July 4th
(5)	Memorial Day, July 4th, and Labor Day
(6)	New Year's, Thanksgiving, and Christmas
(7)	Lincoln's Birthday, Washington's Birthday, and Veterans Day
(8)	Good Friday
(9)	Lincoln's Birthday
(10)	Washington's Birthday
(11)	Columbus Day
(12)	Election Day
(13)	Presidential Election Day
(14)	1/2 Day on Presidential Election Day
(15)	Veterans Day
(16)	Day after Thanksgiving
(17)	July 4th
(18)	1/2 Day before Christmas
(19)	1/2 Day before New Years
(20)	Thanksgiving
(21)	New Year's Day
(22)	Christmas
(23)	Day before Christmas
(24)	Day before New Year's
(25)	Presidents' Day
(26)	Martin Luther King, Jr. Day
(27)	Memorial Day
(28)	Easter Sunday

New York State Department of Labor - Bureau of Public Work
State Office Building Campus
Building 12 - Room 130
Albany, New York 12240

REQUEST FOR WAGE AND SUPPLEMENT INFORMATION

As Required by Articles 8 and 9 of the NYS Labor Law

Fax (518) 485-1870 or mail this form for new schedules or for determination for additional occupations.

This Form Must Be Typed

Submitted By: (Check Only One) ☐ Contracting Agency ☐ Architect or Engineering Firm ☐ Public Work District Office Date:

A. Public Work Contract to be let by: (Enter Data Pertaining to Contracting/Public Agency)

1. Name and complete address ☐ (Check if new or change)

Telephone: ( ) Fax: ( )
E-Mail:

2. NY State Units (see Item 5)

- ☐ 01 DOT
- ☐ 02 OGS
- ☐ 03 Dormitory Authority
- ☐ 04 State University Construction Fund
- ☐ 05 Mental Hygiene Facilities Corp.
- ☐ 06 OTHER N.Y. STATE UNIT
- ☐ 07 City
- ☐ 08 Local School District
- ☐ 09 Special Local District, i.e., Fire, Sewer, Water District
- ☐ 1O Village
- ☐ 11 Town
- ☐ 12 County
- ☐ 13 Other Non-N.Y. State (Describe)

3. SEND REPLY TO ☐ check if new or change)
Name and complete address:

Telephone:( ) Fax: ( )
E-Mail:

4. SERVICE REQUIRED. Check appropriate box and provide project information.

- ☐ New Schedule of Wages and Supplements.
  APPROXIMATE BID DATE :
- ☐ Additional Occupation and/or Redetermination

PRC NUMBER ISSUED PREVIOUSLY FOR THIS PROJECT :

OFFICE USE ONLY

B. PROJECT PARTICULARS

5. Project Title _____

Description of Work _____

Contract Identification Number _____

Note: For NYS units, the OSC Contract No. _____

6. Location of Project:
Location on Site _____

Route No/Street Address _____

Village or City _____

Town _____

County _____

7. Nature of Project - Check One:

- ☐ 1. New Building
- ☐ 2. Addition to Existing Structure
- ☐ 3. Heavy and Highway Construction (New and Repair)
- ☐ 4. New Sewer or Waterline
- ☐ 5. Other New Construction (Explain)
- ☐ 6. Other Reconstruction, Maintenance, Repair or Alteration
- ☐ 7. Demolition
- ☐ 8. Building Service Contract

8. OCCUPATION FOR PROJECT :

- ☐ Construction (Building, Heavy Highway/Sewer/Water)
- ☐ Tunnel
- ☐ Residential
- ☐ Landscape Maintenance
- ☐ Elevator maintenance
- ☐ Exterminators, Fumigators
- ☐ Fire Safety Director, NYC Only
- ☐ Guards, Watchmen
- ☐ Janitors, Porters, Cleaners, Elevator Operators
- ☐ Moving furniture and equipment
- ☐ Trash and refuse removal
- ☐ Window cleaners
- ☐ Other (Describe)

9. Has this project been reviewed for compliance with the Wicks Law involving separate bidding? YES ☐ NO ☐

10. Name and Title of Requester

Signature

SEE PAGE TWO FOR LAWS RELATING TO PUBLIC WORK CONTRACTS

NEW YORK STATE DEPARTMENT OF LABOR
Bureau of Public Work - Debarment List

LIST OF EMPLOYERS INELIGIBLE TO BID ON OR BE AWARDED ANY PUBLIC WORK CONTRACT

Under Article 8 and Article 9 of the NYS Labor Law, a contractor, sub-contractor and/or its successor shall be debarred and ineligible to submit a bid on or be awarded any public work or public building service contract/sub-contract with the state, any municipal corporation or public body for a period of five (5) years from the date of debarment when:

- Two (2) final determinations have been rendered within any consecutive six-year (6) period determining that such contractor, sub-contractor and/or its successor has WILLFULLY failed to pay the prevailing wage and/or supplements;
- One (1) final determination involves falsification of payroll records or the kickback of wages and/or supplements.

The agency issuing the determination and providing the information, is denoted under the heading 'Fiscal Officer'. DOL = New York State Department of Labor; NYC = New York City Comptroller's Office; AG = New York State Attorney General's Office; DA = County District Attorney's Office.

Debarment Database: To search for contractors, sub-contractors and/or their successors debarred from bidding or being awarded any public work contract or subcontract under NYS Labor Law Articles 8 and 9, or under NYS Workers' Compensation Law Section 141-b, access the database at this link: https://applications.labor.ny.gov/EDList/searchPage.do

For inquiries where WCB is listed as the "Agency", please call 1-866-546-9322

NYSDOL Bureau of Public Work Debarment List 04/14/2020

Article 8

AGENCY	Fiscal Officer	FEIN	EMPLOYER NAME	EMPLOYER DBA NAME	ADDRESS	DEBARMENT START DATE	DEBARMENT END DATE
DOL	NYC	*****9839	A.J.S. PROJECT MANAGEMENT, INC.		149 FIFTH AVENUE NEW YORK NY 10010	12/29/2016	12/29/2021
DOL	NYC		ABDUL KARIM		C/O NORTH AMERICAN IRON W 1560 DECATUR STREETRIDGEWOOD NY 11385	05/15/2015	05/15/2020
DOL	DOL	*****3344	ACT INC		6409 LAND O LAKES BLVD LAND O LAKES FL 34638	11/10/2015	11/10/2020
DOL	DOL	*****4018	ADIRONDACK BUILDING RESTORATION INC.		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	AG	*****1812	ADVANCED BUILDERS & LAND DEVELOPMENT, INC.		400 OSER AVE #2300HAUPPAUGE NY 11788	09/11/2019	09/11/2024
DOL	DOL	*****1687	ADVANCED SAFETY SPRINKLER INC		261 MILL ROAD P.O BOX 296EAST AURORA NY 14052	07/29/2015	07/29/2020
DOL	DOL	*****1687	ADVANCED SAFETY SPRINKLER INC		261 MILL ROAD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	NYC	*****6775	ADVENTURE MASONRY CORP.		1535 RICHMOND AVENUE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	NYC		AGOSTINHO TOME		405 BARRETTO ST BRONX NY 10474	05/31/2018	05/31/2023
DOL	DOL		AJ TORCHIA		10153 ROBERTS RD SAUQUOIT NY 13456	08/09/2016	08/09/2021
DOL	DOL	*****3344	ALL CATASTROPHE CONSTRUCTION TEAM INC	ACT INC	6409 LAND O LAKES BLVD LAND O LAKES FL 34638	11/10/2015	11/10/2020
DOL	DOL		AMADEO J TORCHIA	TORCHIA'S HOME IMPROVEMEN T	10153 ROBERTS RD SAUQUOIT NY 13456	08/09/2016	08/09/2021
DOL	NYC		AMJAD NAZIR		2366 61ST ST BROOKLYN NY 11204	12/15/2016	12/15/2021
DOL	DOL		ANGELO F COKER			12/04/2018	12/04/2023
DOL	NYC		ANISUL ISLAM		C/O RELIANCE GENERAL CONS 644 OCEAN PARKWAYBROOKLYN NY 11230	09/02/2015	09/02/2020
DOL	DOL		ANITA SALERNO		158 SOLAR ST SYRACUSE NY 13204	01/07/2019	01/07/2024
DOL	DA		ANTHONY CARDINALE		58-48 59TH STREET MASPETH NY 11378	05/16/2012	05/08/2020
DOL	DOL		ANTHONY J MINGARELLI JR		C/O T & T CONCRETE INC 2560 HAMBURG TURNPIKELACKAWANNA NY 14218	07/08/2015	07/08/2020
DOL	NYC		ANTHONY J SCLAFANI		149 FIFTH AVE NEW YORK NY 10010	12/29/2016	12/29/2021
DOL	DOL		ANTHONY PERGOLA		3 WEST MAIN ST/SUITE 208 ELMSFORD NY 10323	01/23/2017	01/23/2022
DOL	DOL		ANTONIO ESTIVEZ		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	*****3020	APCO CONTRACTING CORP		24 SOUTH MARYLAND AVENUE PORT WASHINGTON NY 11050	09/24/2012	09/02/2020
DOL	NYC	*****9232	ARKAY CONSTRUCTION INC		102-104 GREYLOCK AVENUE BELLEVILLE NJ 07109	07/15/2015	07/15/2020
DOL	DOL		ARNOLD A. PAOLINI		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	NYC		ARSHAD MEHMOOD		168-42 88TH AVENUE JAMAICA NY 11432	11/20/2019	11/20/2024
DOL	DOL		ARVINDER ATWAL		65 KENNETH PLACE NEW HYDE PARK NY 11040	07/19/2017	07/19/2022
DOL	NYC	*****4779	ASTORIA GENERAL CONTRACTING CORP		35-34 31ST STREET LONG ISLAND CITY NY 11106	09/02/2015	09/02/2020
DOL	NYC	*****7217	ASTRO COMMUNICATIONS OF NY CORP		79 ALEXANDER AVE- STE 36A BRONX NY 10454	10/30/2015	10/30/2020
DOL	NYC	*****6046	ATLANTIC SUN CONTRUCTION CORP		58-46 59TH AVENUE MASPETH NY 11378	05/08/2015	05/08/2020
DOL	NYC	*****6683	ATLAS RESTORATION CORP.		35-12 19TH AVENUE ASTORIA NY 11105	08/02/2017	08/02/2022
DOL	NYC	*****5532	ATWAL MECHANICALS, INC		65 KENNETH PLACE NEW HYDE PARK NY 11040	07/19/2017	07/19/2022

DOL	NYC	*****2591	AVI 212 INC.		260 CROPSEY AVENUE APT 11GBROOKLYN NY 11214	10/30/2018	10/30/2023
DOL	AG		AVTAR SINGH		116-24 127TH STREET SOUTH OZONE PARK NY 11420	12/22/2015	12/22/2020
DOL	AG		BALDEV SINGH		116-24 127TH STREET SOUTH OZONE PARK NY 11420	12/22/2015	12/22/2020
DOL	NYC		BALWINDER SINGH		421 HUDSON ST SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	DOL		BARRY KINNEY		6409 LAND O LAKES BLVD LAND O LAKES FL 34638	11/10/2015	11/10/2020
DOL	NYC	*****3915	BEACON RESTORATION INC		SUITE B-8 782 PELHAM PARKWAY SOUTHBRONX NY 10462	04/21/2016	04/21/2021
DOL	NYC	*****8416	BEAM CONSTRUCTION, INC.		50 MAIN ST WHITE PLAINS NY 10606	01/04/2019	01/04/2024
DOL	DOL		BIAGIO CANTISANI			06/12/2018	06/12/2023
DOL	DOL	*****4512	BOB BRUNO EXCAVATING, INC		5 MORNINGSIDE DR AUBURN NY 13021	05/28/2019	05/28/2024
DOL	DOL		BOGDAN MARKOVSKI		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DOL	*****8551	BRANDY'S MASONRY		216 WESTBROOK STREET P O BOX 304SAYRE PA 18840	08/09/2016	08/09/2021
DOL	DOL	*****1449	BRRESTORATION NY INC		140 ARCADIA AVENUE OSWEGO NY 13126	09/12/2016	09/12/2021
DOL	DOL		BRUCE MORSEY		C/O KENT HOLLOW SIDING LL 29A BRIDGE STREETNEW MILFORD CT 06776	01/15/2016	01/15/2021
DOL	DOL		BRUCE P. NASH JR.		5841 BUTTERNUT ROAD EAST SYRACUSE NY 13057	09/12/2018	09/12/2023
DOL	DOL	*****0225	C&D LAFACE CONSTRUCTION, INC.		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	02/03/2025
DOL	DOL	*****8809	C.B.E. CONTRACTING CORPORATION		310 MCGUINESS BLVD GREENPOINT NY 11222	03/07/2017	03/07/2022
DOL	DOL	*****9383	C.C. PAVING AND EXCAVATING, INC.		2610 SOUTH SALINA ST SUITE 12SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	NYC		CALVIN WALTERS		465 EAST THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL		CANTISANI & ASSOCIATES LTD		442 ARMONK RD MOUNT KISCSO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CANTISANI HOLDING LLC			06/12/2018	06/12/2023
DOL	DOL		CARIBBEAN POOLS		C/O DOUGLAS L MALARKEY 64 VICTORIA DRIVEBINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DOL		CARMEN RACHETTA		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	02/03/2025
DOL	DOL		CARMENA RACHETTA		8531 OSWEGO ROAD BALDWINSVILLE NY 13027	02/03/2020	02/03/2025
DOL	DOL	*****3812	CARMODY "2" INC			06/12/2018	06/12/2023
DOL	DOL	*****1143	CARMODY BUILDING CORP	CARMODY CONTRACTIN G AND CARMODY CONTRACTIN G CORP.	442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY CONCRETE CORPORATION			06/12/2018	06/12/2023
DOL	DOL		CARMODY ENTERPRISES, LTD.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY INC		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	*****3812	CARMODY INDUSTRIES INC			06/12/2018	06/12/2023
DOL	DOL		CARMODY MAINTENANCE CORPORATION		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY MASONRY CORP		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	*****8809	CBE CONTRACTING CORP		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	AG		CESAR J. AGUDELO		81-06 34TH AVENUE APT. 6EJACKSON HEIGHTS NY 11372	02/07/2018	02/07/2023

DOL	DOL	*****7655	CHAMPION CONSTRUCTION SERVICES CORP		2131 SCHENECTADY AVENUE BROOKLYN NY 11234	11/18/2015	11/18/2020
DOL	DOL		CHARLES ZIMMER JR		216 WESTBROOK STREET P O BOX 304SAYRE PA 18840	08/09/2016	08/09/2021
DOL	DOL		CHRISTINE J HEARNE		C/O CJ-HEARNE CONSTRUCTIO 131 PONCE DE LEON AVE NEATLANTA GA 30308	12/01/2015	12/01/2020
DOL	DOL		CHRISTOPHER J MAINI		19 CAITLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	DOL		CHRISTOPHER PAPASTEFANOU A/K/A CHRIS PAPASTEFANOU		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL	*****0671	CJ-HEARNE CONSTRUCTION CO		SUITE 204 131 PONCE DE LEON AVENUEATLANTA GA 30308	12/01/2015	12/01/2020
DOL	DOL	*****1927	CONSTRUCTION PARTS WAREHOUSE, INC.	CPW	5841 BUTTERNUT ROAD EAST SYRACUSE NY 13057	09/12/2018	09/12/2023
DOL	NYC	*****2164	CREATIVE TRUCKING INC		58-83 54TH STREET MASPETH NY 11378	02/26/2016	02/26/2021
DOL	DOL	*****2524	CSI ELECTRICAL & MECHANICAL INC		42-32 235TH ST DOUGLASTON NY 11363	01/14/2019	01/14/2024
DOL	DOL	*****7761	D L MALARKEY CONSTRUCTION		64 VICTORIA DRIVE BINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DOL	*****7888	D L MALARKEY CONSTRUCTION INC		64 VICTORIA DRIVE BINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DOL	*****5629	DAKA PLUMBING AND HEATING LLC		2561 ROUTE 55 POUGHQUAG NY 12570	02/19/2016	02/19/2021
DOL	NYC		DALJIT KAUR BOPARAI		185-06 56TH AVE FRESH MEADOW NY 11365	10/17/2017	10/17/2022
DOL	DOL		DANICA IVANOSKI		61 WILLETT ST. PASSAIC NJ 07503	10/26/2016	10/26/2021
DOL	DOL		DARIAN L COKER		2610 SOUTH SALINA ST SUITE 2CSYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL		DARYL T RIEKS		C/O RIEKS CONTRACTING LLC 4804 GAHWILER ROADAUBURN NY 13021	05/01/2015	05/01/2020
DOL	NYC	*****7707	DASSLE CONTRACTING INC		213-37 39TH AVE/SUITE 120 BAYSIDE NY 11360	05/08/2015	05/08/2020
DOL	DOL		DAVID MARTINEZ		C/O EMPIRE TILE INC 6 TREMONT COURTHUNTINGTON STATION NY 11746	03/08/2016	03/08/2021
DOL	NYC		DAVID WEINER		14 NEW DROP LANE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	DOL		DEBBIE STURDEVANT		29 MAPLEWOOD DRIVE BINGHAMTON NY 13901	02/21/2017	02/21/2022
DOL	AG		DEBRA MARTINEZ		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL		DEDA GAZIVODAN		C/O DAKA PLUMBING AND H 2561 ROUTE 55POUGHQUAG NY 12570	02/19/2016	02/19/2021
DOL	DOL		DELPHI PAINTING & DECORATING CO INC		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL		DENNIS SCHWANDTNER		C/O YES SERVICE AND REPAI 145 LODGE AVEHUNTINGTON STATION NY 11476	08/09/2016	08/09/2021
DOL	DOL		DF CONTRACTORS OF ROCHESTER, INC.		1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	DOL		DF CONTRACTORS, INC.		1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	NYC		DIMITRIOS KOUTSOUKOS		C/O ASTORIA GENERAL CONTR 35-34 31ST STREETLONG ISLAND CITY NY 11106	09/02/2015	09/02/2020
DOL	NYC		DIMITRIOS TSOUMAS		35-12 19TH AVENUE ASTORIA NY 11105	08/02/2017	08/02/2022
DOL	DOL		DOMENICO LAFACE		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	02/03/2025
DOL	DOL	*****3242	DONALD R. FORSAY	DF LAWN SERVICE	1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	DOL		DONALD R. FORSAY		1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	DOL		DORIS SKODA		C/O APCO CONTRACTING CORP 24 SOUTH MARYLAND AVENUEPORT WASHINGTON NY 11050	09/24/2012	09/02/2020

DOL	NYC	*****7404	DOSANJH CONSTRUCTION CORP		9439 212TH STREET QUEENS VILLAGE NY 11428	02/25/2016	02/25/2021
DOL	DOL		DOUGLAS L MALARKEY	MALARKEY CONSTRUCTION	64 VICTORIA DRIVE B INGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	NYC		DUARTE LOPES		66-05 WOODHAVEN BLVD. STE 2REGO PARK NY 11374	04/20/2017	04/20/2022
DOL	DOL		E C WEBB		6409 LAND O LAKES BLVD LAND O LAKES FL 34638	11/10/2015	11/10/2020
DOL	DOL	*****5175	EAGLE MECHANICAL AND GENERAL CONSTRUCTION LLC		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
DOL	DOL		EARL L WILSON	WILSON BROTHER DRYWALL CONTRACTORS	36 ABERSOLD STREET ROCHESTER NY 14621	08/31/2015	08/31/2020
DOL	DOL		EAST COAST PAVING		2238 BAKER RD GILLETT PA 16923	03/12/2018	03/12/2023
DOL	NYC	*****4269	EAST PORT EXCAVATION & UTILITIES		601 PORTION RD RONKONKOMA NY 11779	11/18/2016	11/18/2021
DOL	DOL	*****0780	EMES HEATING & PLUMBING CONTR		5 EMES LANE MONSEY NY 10952	01/20/2002	01/20/3002
DOL	DOL	*****3270	EMPIRE TILE INC		6 TREMONT COURT HUNTINGTON STATION NY 11746	03/08/2016	03/08/2021
DOL	NYC	*****5917	EPOCH ELECTRICAL, INC		97-18 50TH AVE CORONA NY 11368	04/19/2018	04/19/2024
DOL	DOL	*****7403	F & B PAINTING CONTRACTING INC		2 PARKVIEW AVENUE HARRISON NY 10604	09/26/2016	09/26/2021
DOL	DOL		FAIGY LOWINGER		11 MOUNTAIN RD 28 VAN BUREN DRMONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL		FAY MATTHEW		C/O CHAMPION CONSTRUCTION 2131 SCHENECTADY AVENUEBROOKLYN NY 11234	11/18/2015	11/18/2020
DOL	DOL		FAZIA GINA ALI-MOHAMMED	C/O CHAMPION CONSTRUCTION	2131 SCHENECTADY AVENUE BROOKLYN NY 11234	11/18/2015	11/18/2020
DOL	DOL		FRANK BENEDETTO		19 CATLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	DOL		FRANK BENEDETTO		C/O F & B PAINTING CONTRA 2 PARKVIEW AVENUEHARRISON NY 10604	09/26/2016	09/26/2021
DOL	DOL	*****4722	FRANK BENEDETTO AND CHRISTOPHER J MAINI	B & M CONCRETE	19 CAITLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	NYC		FRANK MAINI		1766 FRONT ST YORKTOWN HEIGHTS NY 10598	01/17/2018	01/17/2023
DOL	NYC	*****6616	G & G MECHANICAL ENTERPRISES, LLC.		1936 HEMPSTEAD TURNPIKE EAST MEDOW NY 11554	11/29/2019	11/29/2024
DOL	DOL		GABRIEL FRASSETTI			04/10/2019	04/10/2024
DOL	DOL		GALINDA ROTENBERG		C/O GMDV TRANS INC 67-48 182ND STREETFRESH MEADOWS NY 11365	06/24/2016	06/24/2021
DOL	DOL		GEOFF CORLETT		415 FLAGGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DA		GEORGE LUCEY		150 KINGS STREET BROOKLYN NY 11231	01/19/1998	01/19/2998
DOL	DOL		GIGI SCHNECKENBURGER		261 MILL RD EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DOL		GIOVANNI LAFACE		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	02/03/2025
DOL	NYC	*****3164	GLOBE GATES INC	GLOBAL OVERHEAD DOORS	405 BARRETTO ST BRONX NY 10474	05/31/2018	05/31/2023
DOL	DOL	*****5674	GMDV TRANS INC		67-48 182ND STREET FRESH MEADOWS NY 11365	06/24/2016	06/24/2021
DOL	NYC		GREAT ESTATE CONSTRUCTION, INC.		327 STAGG ST BROOKLYN NY 11206	10/10/2017	10/10/2022
DOL	DOL		GREGORY S. OLSON		P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		HANS RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	NYC		HARMEL SINGH		15 CLINTON LANE HICKSVILLE NY 11801	02/25/2016	02/25/2021

DOL	NYC		HAROLD KUEMMEL		58-83 54TH STREET MASPETH NY 11378	02/26/2016	02/26/2021
DOL	NYC	*****3228	HEIGHTS ELEVATOR CORP.		1766 FRONT ST YORKTOWN HEIGHTS NY 10598	01/17/2018	01/17/2023
DOL	DOL		HENRY VAN DALRYMPLE		2663 LANTERN LANE ATLANTA GA 30349	12/01/2015	12/01/2020
DOL	DOL	*****8282	IDEMA DEVELOPMENT INC		91 COLLEGE AVENUE POUGHKEEPSIE NY 12603	12/04/2015	12/04/2020
DOL	DOL	*****8282	IDEMA GENERAL CONTRACTORS INC		91 COLLEGE AVENUE POUGHKEEPSIE NY 12603	12/04/2015	12/04/2020
DOL	DOL	*****7001	INTEGRATED CONSTRUCTION & POWER SYSTEMS INC		SUITE 100 2105 W GENESEE STREETSYRACUSE NY 13219	01/06/2016	01/06/2021
DOL	DOL	*****5131	INTEGRITY MASONRY, INC.	M&R CONCRETE	722 8TH AVE WATERVLIET NY 12189	06/05/2018	06/05/2023
DOL	DOL		IRENE KASELIS		32 PENNINGTON AVE WALDWICK NJ 07463	05/30/2019	05/30/2024
DOL	AG		J A M CONSTRUCTION CORP		SUITE 125 265 SUNRISE HIGHWAYROCKVILLE CENTRE NY 10457	04/07/2016	04/07/2021
DOL	DOL		J.A. HIRES CADWALLADER		P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		JAMES B RHYNDERS		91 COLLEGE AVENUE POUGHKEEPSIE NY 12603	12/04/2015	12/04/2020
DOL	DOL		JAMES C. DELGIACCO		722 8TH AVE WATERVLIET NY 12189	06/05/2018	06/05/2023
DOL	DOL		JAMES E RHYNDERS		91 COLLEGE AVENUE POUGHKEEPSIE NY 12603	12/04/2015	12/04/2020
DOL	AG		JAMES FALCONE		SUITE 125 265 SUNRISE HIGHWAYROCKVILLE CENTRE NY 10457	04/07/2016	04/07/2021
DOL	DOL		JAMES LIACONE		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		JAMES RACHEL		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		JAMES RHYNDERS SR		91 COLLEGE AVENUE POUGHKEEPSIE NY 12603	12/04/2015	12/04/2020
DOL	DOL		JAMES SICKAU		3090 SHIRLEY ROAD NORTH COLLINS NY 14111	04/19/2011	07/08/2020
DOL	DOL		JASON W MILLIMAN		C/O ROCHESTER ACOUSTICAL P O BOX 799HILTON NY 14468	02/19/2016	02/19/2021
DOL	DOL	*****5368	JCH MASONRY & LANDSCAPING INC.		35 CLINTON AVE OSSINING NY 10562	09/12/2018	09/12/2023
DOL	NYC		JENNIFER GUERRERO		1936 HEMPSTEAD TURNPIKE EAST MEADOW NY 11554	11/29/2019	11/29/2024
DOL	DOL		JESSICA WHITESIDE		C/O BRRESTORATION NY INC 140 ARCADIA AVENUEOSWEGO NY 13126	09/12/2016	09/12/2021
DOL	AG		JOHN ANTHONY MASSINO		36-49 204TH STREET BAYSIDE NY 11372	02/07/2018	02/07/2023
DOL	DOL		JOHN F. CADWALLADER		200 LATTA BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL	*****4612	JOHN F. CADWALLADER, INC.	THE GLASS COMPANY	P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		JOHN GOCEK		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	AG	*****0600	JOHNCO CONTRACTING, INC.		36-49 204TH STREET BAYSIDE NY 11372	02/07/2018	02/07/2023
DOL	DOL		JON E DEYOUNG		261 MILL RD P.O BOX 296EAST AURORA NY 14052	07/29/2015	07/29/2020
DOL	DOL		JON E DEYOUNG		261 MILL RD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DOL		JORI PEDERSEN		415 FLAGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DOL		JOSE CHUCHUCA		35 CLINTON AVE OSSINING NY 10562	09/12/2018	09/12/2023
DOL	AG		JOSEPH FALCONE		SUITE 125 265 SUNRISE HIGHWAYROCKVILLE CENTRE NY 10457	04/07/2016	04/07/2021

DOL	NYC		JOSEPH FOLEY		66-05 WOODHAVEN BLVD. STE 2REGO PARK NY 11374	04/20/2017	04/20/2022
DOL	DOL	*****9273	JOSEPH M LOVETRO		P O BOX 812 BUFFALO NY 14220	08/09/2016	08/09/2021
DOL	NYC		JOSEPH MARTINO		1535 RICHMOND AVENUE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	DOL		JOY MARTIN		2404 DELAWARE AVE NIGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL		JULIUS AND GITA BEHREND		5 EMES LANE MONSEY NY 10952	11/20/2002	11/20/3002
DOL	DOL	*****5062	K R F SITE DEVELOPMENT INC		375 LAKE SHORE DRIVE PUTNAM VALLEY NY 10579	01/23/2017	01/23/2022
DOL	NYC		K.S. CONTRACTING CORP.		29 PHILLIP DRIVE PARSIPPANY NJ 07054	02/13/2017	02/13/2022
DOL	DOL		KATIE BURDICK		2238 BAKER RD GILLETT PA 16923	03/12/2018	03/12/2023
DOL	DOL		KENNETH FIORENTINO		375 LAKE SHORE DRIVE PUTNAM VALLEY NY 10579	01/23/2017	01/23/2022
DOL	DOL	*****9732	KENT HOLLOW SIDING LLC		29A BRIDGE STREET NEW MILFORD CT 06776	01/15/2016	01/15/2021
DOL	DOL		KIM SOROCENSKI		C/O SOLUTION MATTERS INC 198 NORWOOD ROADPORT JEFFERSON NY 11776	11/19/2015	11/19/2020
DOL	DOL	*****3490	L & M CONSTRUCTION/DRYWALL INC.		1079 YONKERS AVE YONKERS NY 10704	08/07/2018	08/07/2023
DOL	DA	*****8816	LAKE CONSTRUCTION AND DEVELOPMENT CORPORATION		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL	*****6224	LAKESIDE FIRE SPRINKLERS LLC		125 CHAUTAUQUA AVENUE LAKEWOOD NY 14750	06/24/2015	06/24/2020
DOL	AG	*****4643	LALO DRYWALL, INC.		221 OLD FORD ROAD NEW PLATZ NY 12561	05/20/2016	05/20/2021
DOL	DOL	*****4505	LARAPINTA ASSOCIATES INC		29 MAPLEWOOD DRIVE BINGHAMTON NY 13901	02/21/2017	02/21/2022
DOL	DOL		LAVERN GLAVE		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	06/24/2016	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	06/24/2016	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	01/17/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	08/14/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	08/14/2017	08/14/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	01/17/2017	09/19/2022
DOL	DA	*****4460	LONG ISLAND GLASS & STOREFRONTS, LLC		4 MANHASSET TRL RIDGE NY 11961	09/06/2018	09/06/2023
DOL	AG	*****4216	LOTUS-C CORP.		81-06 34TH AVENUE APT. 6EJACKSON HEIGHTS NY 11372	02/07/2018	02/07/2023
DOL	NYC		LUBOMIR PETER SVOBODA		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	AG		LUIS MARTINEZ	LALO DRYWALL	211 MAIN ST. NEW PALTZ NY 12561	05/20/2016	05/20/2021
DOL	NYC		M & L STEEL & ORNAMENTAL IRON CORP.		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024

DOL	DOL		M ANVER BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	AG	*****6957	M B DIN CONSTRUCTION INC		8831 20TH AVENUE/SUITE 6E BROOKLYN NY 11214	11/17/2015	11/17/2020
DOL	DOL		M. ANVER BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	NYC	*****9590	MACK GLASSNAUTH IRON WORKS INC		137 LIBERTY AVENUE BROOKLYN NY 11212	12/21/2015	12/21/2020
DOL	DOL	*****1784	MADISON AVE CONSTRUCTION CORP		39 PENNY STREET WEST ISLIP NY 11795	11/02/2016	11/02/2021
DOL	DOL		MALARKEY'S BAR & GRILL LLC		64 VICTORIA DRIVE BINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DOL	*****0705	MALARKEY'S PUB & GRUB LLC		64 VICTORIA DRIVE BINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DA		MANUEL P TOBIO		150 KINGS STREET BROOKLYN NY 14444	08/19/1998	08/19/2998
DOL	DA		MANUEL TOBIO		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	NYC		MAREK FABIJANOWSKI		50 MAIN ST WHITE PLAINS NY 10606	01/04/2019	01/04/2024
DOL	DOL		MARIACHI'S PIZZERIA		C/O DOUGLAS L MALARKEY 64 VICTORIA DRIVEBINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DOL		MARK MIONIS		6409 LAND O LAKES BLVD LAND O LAKES FL 34638	11/10/2015	11/10/2020
DOL	NYC		MARTINE ALTER		1010 NORTHERN BLVD. GREAT NECK NY 11021	03/09/2017	03/09/2022
DOL	DOL		MARVIN A STURDEVANT		29 MAPLEWOOD DRIVE BINGHAMTON NY 13901	02/21/2017	02/21/2022
DOL	DOL		MASONRY CONSTRUCTION, INC.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	*****3333	MASONRY INDUSTRIES, INC.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	NYC		MATINA KARAGIANNIS		97-18 50TH AVE CORONA NY 11368	04/19/2018	04/19/2023
DOL	DOL		MATTHEW IDEMA GENERAL CONTRACTORS INC		91 COLLEGE AVENUE POUGHKEEPSIE NY 12603	12/04/2015	12/04/2020
DOL	DOL		MATTHEW P. KILGORE		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	DOL		MAURICE GAWENO		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	*****6416	MCCALL MASONRY		P O BOX 304 SAYRE PA 18840	08/09/2016	08/09/2021
DOL	DOL		MCLEAN "MIKKI BEANE"		1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL		MCLEAN "MIKKI" DRAKE		1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL		MCLEAN M DRAKE-BEANE		1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL	*****9445	MCLEAN M WALSH	ELITE PROFESSION AL PAINTING OF CNY	1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL	*****9445	MCLEAN M WALSH	ELITE PROFESSION AL PAINTING OF CNY	1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	NYC	*****5330	METRO DUCT SYSTEMS INC		1219 ASTORIA BOULEVARD LONG ISLAND CITY NY 11102	04/16/2014	11/19/2020
DOL	DOL		MICHAEL A PASCARELLA		SUITE 100 2105 WEST GENESEE STREET SYRACUSE NY 13219	01/06/2016	01/06/2021
DOL	NYC		MICHAEL HIRSCH		C/O MZM CORP 163 S MAIN STREETNEW CITY NY 10956	01/28/2016	01/28/2021
DOL	DOL		MICHAEL LENIHAN		1079 YONKERS AVE UNIT 4YONKERS NY 10704	08/07/2018	08/07/2023
DOL	AG		MICHAEL RIGLIETTI		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL		MICHAEL WILSON	WILSON BROTHER DRYWALL CONTRACTOR S	36 ABERSOLD STREET ROCHESTER NY 14621	08/31/2015	08/31/2020
DOL	DOL	*****4829	MILESTONE ENVIRONMENTAL CORPORATION		704 GINESI DRIVE SUITE 29MORGANVILLE NJ 07751	04/10/2019	04/10/2024

DOL	NYC	*****9926	MILLENNIUM FIRE PROTECTION, LLC		325 W. 38TH STREET SUITE 204NEW YORK NY 10018	11/14/2019	11/14/2024
DOL	NYC	*****0627	MILLENNIUM FIRE SERVICES, LLC		14 NEW DROP LNE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	AG		MOHAMMED N CHATHA		8831 20TH AVENUE/SUITE 6E BROOKLYN NY 11214	11/17/2015	11/17/2020
DOL	DOL	*****2737	MOUNTAIN'S AIR INC		2471 OCEAN AVENUE- STE 7A BROOKLYN NY 11229	09/24/2012	09/18/2020
DOL	NYC	*****3826	MOVING MAVEN OF NY, INC.		1010 NORTHERN BLVD. GREAT NECK NY 11021	03/09/2017	03/09/2022
DOL	NYC	*****3550	MOVING MAVEN, INC		1010 NORTHERN BLVD. GREAT NECK NY 11021	03/09/2017	03/09/2022
DOL	AG		MSR ELECTRICAL CONSTRUCTION CORP.		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL		MUHAMMAD BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	DOL		MUHAMMAD BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	DOL		MUHAMMAD PERVAIZ		C/O CHAMPION CONSTRUCTION 2131 SCHENECTADY AVENUEBROOKLYN NY 11234	11/18/2015	11/18/2020
DOL	NYC	*****3613	MZM CORP		163 S MAIN STREET NEW CITY NY 10956	01/28/2016	01/28/2021
DOL	DA	*****9786	NATIONAL INSULATION & GC CORP		180 MILLER PLACE HICKSVILLE NY 11801	12/12/2018	12/12/2023
DOL	DA	*****6988	NEW YORK INSULATION INC		58-48 59TH STREET MASPETH NY 11378	05/16/2012	05/08/2020
DOL	NYC	*****4839	NEW YORK RIGGING CORP		58-83 54TH STREET MASPETH NY 11378	02/26/2016	02/26/2021
DOL	NYC		NICHOLAS FILIPAKIS		7113 FORT HAMILTON PARKWA BROOKLYN NY 11228	12/09/2016	12/09/2021
DOL	NYC	*****1968	NORTH AMERICAN IRON WORKS INC		1560 DECATUR STREET RIDGEWOOD NY 11385	05/15/2015	05/15/2020
DOL	DOL	*****6966	NORTH COUNTRY DRYWALL AND PAINT		23167 COUNTY ROUTE 59 DEXTER NY 13634	10/24/2016	10/24/2021
DOL	DOL	*****0065	NORTHEAST LANDSCAPE AND MASONRY ASSOC		3 WEST MAIN ST/SUITE 208 ELMSFORD NY 10523	01/23/2017	01/23/2022
DOL	DOL	*****1845	OC ERECTERS, LLC A/K/A OC ERECTERS OF NY INC.		1207 SW 48TH TERRACE DEERFIELD BEACH FL 33442	01/16/2018	01/16/2023
DOL	NYC	*****0818	ONE TEN RESTORATION, INC.		2366 61ST ST BROOKLYN NY 11204	12/15/2016	12/15/2021
DOL	NYC		ORSON ARROYO		C/O METRO DUCT SYSTEMS 12-19 ASTORIA BOULEVARDLONG ISLAND CITY NY 11102	04/16/2014	11/19/2020
DOL	NYC		PARESH SHAH		29 PHILLIP DRIVE PARSIPPANY NJ 07054	02/13/2017	02/13/2022
DOL	NYC	*****9422	PELIUM CONSTRUCTION, INC.		22-33 35TH ST. ASTORIA NY 11105	12/30/2016	12/30/2021
DOL	DOL		PETER M PERGOLA		3 WEST MAIN ST/SUITE 208 ELMSFORD NY 10523	01/23/2017	01/23/2022
DOL	DOL		PIERRE LAPORT		224 COUNTY HIGHWAY 138 BROADALBIN NY 12025	03/07/2017	03/07/2022
DOL	DOL	*****1543	PJ LAPORT FLOORING INC		224 COUNTY HIGHWAY 138 BROADALBIN NY 12025	03/07/2017	03/07/2022
DOL	NYC	*****5771	PMJ ELECTRICAL CORP		7113 FORT HAMILTON PARKWA BROOKLYN NY 11228	12/09/2016	12/09/2021
DOL	DOL	*****0466	PRECISION BUILT FENCES, INC.		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	NYC	*****4532	PROFESSIONAL PAVERS CORP.		66-05 WOODHAVEN BLVD. REGO PARK NY 11374	04/20/2017	04/20/2022
DOL	DOL	*****6895	PROLINE CONCRETE OF WNY INC		3090 SHIRLEY ROAD NORTH COLLINS NY 14111	04/19/2011	07/08/2020
DOL	DA	*****6817	QUADRANT METAL BUILDINGS LLC		2740 SW MARTIN DOWNS BLVD PALM CITY FL 34990	08/25/2016	08/25/2021
DOL	NYC		RAMESHWAR ASU		137 LIBERTY AVENUE BROOKLYN NY 11212	12/21/2015	12/21/2020
DOL	NYC		RANTIK PARIKH		13 LORIANN ROAD WARREN NJ 07059	07/15/2015	07/15/2020
DOL	DOL	*****1068	RATH MECHANICAL CONTRACTORS, INC.		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025

DOL	DOL	*****2633	RAW POWER ELECTRIC CORP		3 PARK CIRCLE MIDDLETOWN NY 10940	01/30/2018	01/30/2023
DOL	AG	*****7015	RCM PAINTING INC.		69-06 GRAND AVENUE 2ND FLOORMASPETH NY 11378	02/07/2018	02/07/2023
DOL	DOL		REGINALD WARREN		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	NYC	*****3461	RELIANCE GENERAL CONSTRUCTION INC		644 OCEAN PARKWAY BROOKLYN NY 11230	09/02/2015	09/02/2020
DOL	DA		RIANN MULLER		2740 SW MARTIN DOWNS BLVD PALM CITY FL 34990	08/25/2016	08/25/2021
DOL	DOL	*****9148	RICH T CONSTRUCTION		107 WILLOW WOOD LANE CAMILLUS NY 13031	11/13/2018	11/13/2023
DOL	DOL		RICHARD MACONE		8617 THIRD AVE BROOKLYN NY 11209	09/17/2018	09/17/2023
DOL	DOL		RICHARD REGGIO		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	DOL	*****9148	RICHARD TIMIAN	RICH T CONSTRUCTION	108 LAMONT AVE SYRACUSE NY 13209	10/16/2018	10/16/2023
DOL	DOL		RICHARD TIMIAN JR.		108 LAMONT AVE SYRACUSE NY 13209	10/16/2018	10/16/2023
DOL	DOL		RICHARD TIMIAN JR.		108 LAMONT AVE SYRACUSE NY 13209	11/13/2018	11/13/2023
DOL	DOL	*****8618	RIEKS CONTRACTING LLC		4804 GAHWILER ROAD AUBURN NY 13021	05/01/2015	05/01/2020
DOL	DOL		ROBBYE BISSESAR		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	01/11/2003	01/11/3003
DOL	DOL		ROBERT A. VALERINO		3841 LANYARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
DOL	DOL		ROBERT BRUNO		3 GAYLORD ST AUBURN NY 13021	11/15/2016	11/15/2021
DOL	DOL		ROBERT BRUNO		5 MORNINGSIDE DRIVE AUBURN NY 13021	05/28/2019	05/28/2024
DOL	NYC		ROBERT HOHMAN		149 FIFTH AVE NEW YORK NY 10010	12/29/2016	12/29/2021
DOL	DOL		ROBERT TORDELLA		125 CHAUTAUQUA AVENUE LAKEWOOD NY 14750	06/24/2015	06/24/2020
DOL	DOL	*****3859	ROCHESTER ACOUSTICAL CORP		P O BOX 799 HILTON NY 14468	02/19/2016	02/19/2021
DOL	DOL		RODERICK PUGH		404 OAK ST SUITE 101SYRACUSE NY 13203	07/23/2018	07/23/2023
DOL	DOL	*****4880	RODERICK PUGH CONSTRUCTION INC.		404 OAK ST SUITE 101SYRACUSE NY 13203	07/23/2018	07/23/2023
DOL	NYC		RODNEY SCOTT		201 HEMPSTEAD AVE WEST HEMPSTEAD NY 11552	10/30/2015	10/30/2020
DOL	DOL		ROMEO WARREN		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL		RONALD MESSEN		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL		ROSEANNE CANTISANI			06/12/2018	06/12/2023
DOL	DOL		RYAN ALBIE		21 S HOWELLS POINT ROAD BELLPORT NY 11713	02/21/2017	02/21/2022
DOL	DOL	*****3347	RYAN ALBIE CONTRACTING INC		21 S HOWELLS POINT ROAD BELLPORT NY 11713	02/21/2017	02/21/2022
DOL	DOL	*****1365	S & L PAINTING, INC.		11 MOUNTAIN ROAD P.O BOX 408MONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL	*****7730	S C MARTIN GROUP INC.		2404 DELAWARE AVE NIAGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	NYC		SABIR MUHAMMED		SUITE B-8 782 PELHAM PARKWAY SOUTHBRONX NY 10462	04/21/2016	04/21/2021
DOL	DOL		SALVATORE A FRESINA			08/26/2016	08/26/2021
DOL	DOL		SAM FRESINA			08/26/2016	08/26/2021
DOL	NYC	*****0349	SAM WATERPROOFING INC		168-42 88TH AVENUE APT.1 AJAMAICA NY 11432	11/20/2019	11/20/2024
DOL	NYC		SANDEEP BOPARAI		185-06 56TH AVE FRESH MEADOW NY 11365	10/17/2017	10/17/2022
DOL	NYC	*****2117	SCOTT ELECTRICAL SERVICE, LLC.		201 HEMPSTEAD AVE WEST HEMPSTEAD NY 11552	10/30/2015	10/30/2020

DOL	DOL	*****9751	SCW CONSTRUCTION		544 OLD ROUTE 23 ACRE NY 12405	02/14/2017	02/14/2022
DOL	AG		SERGIO RAYMUNDO		109 DUBOIS RD. NEW PALTZ NY 12561	05/20/2016	05/20/2021
DOL	NYC	*****6597	SHAIRA CONSTRUCTION CORP.		421 HUDSON STREET SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	DOL	*****1961	SHANE BURDICK	CENTRAL TRAFFIC CONTROL, LLC.	2238 BAKER ROAD GILLETT PA 16923	03/12/2018	03/12/2023
DOL	DOL		SHANE BURDICK		2238 BAKER ROAD GILLETT PA 16923	03/12/2018	03/12/2023
DOL	DOL		SHANE NOLAN		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		SHULEM LOWINGER		11 MOUNTAIN ROAD 28 VAN BUREN DRMONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL	*****0816	SOLAR ARRAY SOLUTIONS, LLC		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL	*****4025	SOLUTION MATTERS INC		198 NORWOOD ROAD PORT JEFFERSON NY 11776	11/19/2015	11/19/2020
DOL	DOL	*****2221	SOUTH BUFFALO ELECTRIC, INC.		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	DOL	*****3496	STAR INTERNATIONAL INC		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	08/11/2003	08/11/3003
DOL	DOL	*****6844	STEAM PLANT AND CHX SYSTEMS INC.		14B COMMERCIAL AVENUE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL	*****9933	STEED GENERAL CONTRACTORS, INC.		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL		STEFANOS PAPASTEFANOU, JR. A/K/A STEVE PAPASTEFANOU, JR.		256 WEST SADDLE RIVER RD UPPER SADDLE RIVER NJ 07458	05/30/2019	05/30/2024
DOL	DOL	*****9751	STEPHEN C WAGAR		544 OLD ROUTE 23 ACRE NY 12405	02/14/2017	02/14/2022
DOL	DOL		STEVE TATE		415 FLAGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	NYC		STEVEN GOVERNALE		601 PORTION RD RONKONKOMA NY 11779	11/18/2016	11/18/2021
DOL	DOL		STEVEN MARTIN		2404 DELWARE AVE NIAGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL		STEVEN P SUCATO		15-68 208TH STREET BAYSIDE NY 11360	06/23/2016	06/23/2021
DOL	DOL		STEVEN TESTA		50 SALEM STREET - BLDG B LYNNFIELD MA 01940	01/23/2017	01/23/2022
DOL	NYC	*****9432	SUBLINK LTD		346 THIRD AVENUE PELHAM NY 10803	11/19/2015	11/19/2020
DOL	NYC	*****5863	SUKHMANY CONSTRUCTION, INC.		185-06 56TH AVE FRESH MEADOW NY 11365	10/17/2017	10/17/2022
DOL	DOL	*****1060	SUNN ENTERPRISES GROUP, LLC		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DOL	*****8209	SYRACUSE SCALES, INC.		158 SOLAR ST SYRACUSE NY 13204	01/07/2019	01/07/2024
DOL	DOL	*****7441	T & T CONCRETE INC		2560 HAMBURG TURNPIKE P O BOX 367LACKAWANNA NY 14218	07/08/2015	07/08/2020
DOL	DOL		TALAILA OCAMPA		1207 SW 48TH TERRACE DEERFIELD BEACH FL 33442	01/16/2018	01/16/2023
DOL	DOL	*****9852	TAP STEEL INC		ROUTE 26 3101 P O BOX 457CONSTABLEVILLE NY 13325	01/28/2016	01/28/2021
DOL	DOL		TERRY THOMPSON		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
DOL	DOL	*****5570	TESTA CORP		50 SALEM STREET - BLDG B LYNNFIELD MA 01940	01/23/2017	01/23/2022
DOL	DOL	*****0887	THE BRINSON PAINTING CORPORATION		72 TAUNTON PLACE BUFFALO NY 14216	04/14/2015	04/14/2020
DOL	DOL	*****5766	THE COKER CORPORATION	COKER CORPORATIO N	2610 SOUTH SALINA ST SUITE 14SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL	*****8174	THE DALRYMPLE CORPORATION		UNIT 278 541 10TH STREET NWATLANTA GA 30318	12/01/2015	12/01/2020
DOL	DOL	*****8174	THE DALRYMPLE GROUP LLC		289 JONESBORO RD/ STE 216 MCDONOUGH GA 30253	12/01/2015	12/01/2020

DOL	DOL		TIMOTHY A PALUCK		C/O TAP STEEL INC RTE 26 3101/ P O BOX 457CONSTABLEVILLE NY 13325	01/28/2016	01/28/2021
DOL	DOL	*****3453	TORCHIA'S HOME IMPROVEMENT		10153 ROBERTS RD SAUQUOIT NY 13456	08/09/2016	08/09/2021
DOL	DOL	*****8311	TRIPLE B FABRICATING, INC.		61 WILLETT ST. PASSAIC NJ 07503	10/26/2016	10/26/2021
DOL	DOL	*****9407	TURBO GROUP INC		15-68 208TH STREET BAYSIDE NY 11360	06/23/2016	06/23/2021
DOL	DOL	*****6392	V.M.K CORP.		8617 THIRD AVE BROOKLYN NY 11209	09/17/2018	09/17/2023
DOL	NYC		VALERIE VISCONTI		346 THIRD AVENUE PELHAM NY 10803	11/19/2015	11/19/2020
DOL	NYC	*****7361	VIABLE HOLDINGS, INC.	MOVING MAVEN	1010 NORTHERN BLVD. GREAT NECK NY 11021	03/09/2017	03/09/2022
DOL	DOL		VICTOR ALICANTI		42-32 235TH ST DOUGLASTON NY 11363	01/14/2019	01/14/2024
DOL	DOL		VICTOR ROTENBERG		C/O GMDV TRANS INC 67048 182ND STREETFRESH MEADOWS NY 11365	06/24/2016	06/24/2021
DOL	NYC		VIKTAR PATONICH		2630 CROPSEY AVE BROOKLYN NY 11214	10/30/2018	10/30/2023
DOL	DOL		VIKTORIA RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	NYC		VITO GARGANO		1535 RICHMOND AVE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	NYC	*****3673	WALTERS AND WALTERS, INC.		465 EAST AND THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL		WAYNE LIVINGSTON JR	NORTH COUNTRY DRYWALL AND PAINT	23167 COUNTY ROUTE 59 DEXTER NY 13634	10/24/2016	10/24/2021
DOL	DOL	*****3296	WESTERN NEW YORK CONTRACTORS, INC.		3841 LAYNARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
DOL	DOL		WHITE PLAINS CARPENTRY CORP		442 ARMONK RD	06/12/2018	06/12/2023
DOL	DOL		WILLIAM C WATKINS		1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL		WILLIAM DEAK		C/O MADISON AVE CONSTR CO 39 PENNY STREETWEST ISLIP NY 11795	11/02/2016	11/02/2021
DOL	DOL		WILLIE BRINSON		72 TAUNTON PLACE BUFFALO NY 14216	04/14/2015	04/14/2020
DOL	DOL	*****6195	WILSON BROTHER DRYWALL CONTRACTORS		36 ABERSOLD STREET ROCHESTER NY 14621	08/31/2015	08/31/2020
DOL	DOL	*****4043	WINDSHIELD INSTALLATION NETWORK, INC.		200 LATTA BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL	*****4730	XGD SYSTEMS, LLC	TDI GOLF	415 GLAGE AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DOL	*****7345	YES SERVICE AND REPAIRS CORPORATION		145 LODGE AVE HUNTINGTON STATION NY 11476	08/09/2016	08/09/2021
DOL	DOL		YURIY IVANIN		C/O MOUNTAIN'S AIR INC 2471 OCEAN AVENUE-STE 7ABROOKLYN NY 11229	09/24/2012	09/18/2020
DOL	NYC		ZAKIR NASEEM		30 MEADOW ST BROOKLYN NY 11206	10/10/2017	10/10/2022
DOL	NYC	*****8277	ZHN CONTRACTING CORP		30 MEADOW ST BROOKLYN NY 11206	10/10/2017	10/10/2022

Appendix D
Asbestos and Lead Survey Report

Pre-Renovation
Asbestos-Containing Materials
And Lead-Based Paint,
Inspection Report

OF THE:

Erie County Water Authority Guenther Pump Station
3478 Pleasant Avenue
Hamburg, NY 14075
SET# 3368

PREPARED BY:

SIENNA
ENVIRONMENTAL TECHNOLOGIES

PREPARED FOR:

GHD
285 Delaware Avenue, Suite 500
Buffalo, New York 14202

CONDITIONS AS OF:

December 20 , 2018

SIENNA
ENVIRONMENTAL TECHNOLOGIES

Table of Contents

1 Introduction

Sienna Environmental Technologies (Sienna) was retained by GHD to perform an inspection of the Erie County Water Authority's Guenther Pump Station to determine the presence of asbestos-containing materials and lead-based painted/coated materials prior to renovations.

The inspection was conducted on December 4 & 20, 2018.

The scope of inspection work provided is as indicated in the proposal for Inspection Services dated November 20, 2018. The exact scope of renovations was not determined at the time of proposing; Sienna was on-site alongside GHD to conduct and coordinate the fieldwork. Both the main pump station and the adjacent valve chamber were inspected.

Sienna was charged with conducting the following tasks for this project:

1. Conducting an asbestos inspection in accordance with all applicable regulations,
2. Performing an inspection via X-Ray Florescence (XRF) for lead in accordance with all applicable regulations and guidelines, and
3. Providing a summary report of findings.

This report is generated for the exclusive use of the client and is not designed to serve as a specification for abatement. The owner is strongly encouraged to contract with a consultant having a current Asbestos Project Designer Certificate as issued by New York State Department of Labor for the preparation of contract specifications, work plans, and/or drawings prior to requesting bids for the abatement or removal of the materials identified in this report.

2 Asbestos-Containing Materials Inspection

2.1 Methodology

All asbestos inspection work performed by Sienna Environmental Technologies was conducted in accordance with applicable regulations including New York State Department of Labor standards 12 NYCRR Part 56, National Emission Standards for Hazardous Air Pollutants (NESHAPS), the Asbestos Hazard Emergency Response Act, and Occupational Safety and Health Administration regulations. All Sienna Environmental Technologies' personnel assigned to conduct inspections have completed the Environmental Protection Agency (EPA) required training and New York State Department of Labor Division of Safety and Health certification program.

Based on the functional spaces and homogeneous areas (materials uniform in color or texture) identified by Sienna, samples of suspect materials were collected. Techniques used for sample collection were designed to minimize damage to suspected areas, reduce any potential for fiber release, and ensure the safety of the inspector and building occupants.

Samples were analyzed using Polarized Light Microscopy (PLM) in accordance with NYS DOH ELAP Item #198.1 or #198.6. For materials classified as non-friable organically bound materials (NOBs) that were analyzed as equal to or less than 1% asbestos by PLM, additional analysis was performed under Transmission Electron Microscopy (TEM) in accordance with NYS DOH ELAP Item #198.4. The results of this analysis confirmed whether or not a suspect material actually contained asbestos. The confirmed materials and all assumed materials are listed in **Section 2.3 Confirmed Asbestos-Containing Materials and Section 2.4 Assumed Asbestos-Containing Suspect Materials.**

Although the report is a comprehensive analysis of the asbestos inspection work performed, it would be helpful to review all applicable federal, state and local rules, laws and regulations regarding the handling and treatment of asbestos-containing materials (ACM). The following is a list of suggested reading and information sources relating to asbestos:

- New York State Department of Labor Industrial Code Rule 56
- Occupational Safety and Health Administration
- Environmental Protection Agency Rule CFR 763.86 Asbestos Hazard Emergency Response Act
- Environmental Protection Agency Rule 40 CFR, Chapter 61, Subpart M of the National Emission Standards for Hazardous Air Pollutants (NESHAPS)

2.2 Executive Summary

The asbestos inspection included identification, sampling, analysis, and quantification of suspect materials that may be disturbed by the project. By definition an Asbestos-Containing Material (ACM) is any material which contains greater than one percent (>1%) asbestos. Materials which contain asbestos in measurable concentrations less than or equal to one percent (≤1%) are reported as containing "trace" amounts.

Copies of all laboratory analysis reports and chains of custody listing locations of sample collection are located in Appendix C. Refer to floor plans located in Appendix E for specific sample location points. Refer to Appendix F for a summary of all functional spaces which were included as part of this inspection service. For explanation of inspection notes, refer to Section 2.7 for note details and specific comments.

2.3 Confirmed Asbestos-Containing Materials

The following materials have been sampled and analyzed by current EPA AHERA and ELAP protocols and have been proven to contain greater than one percent (>1%) asbestos. Refer to the summary table within Section 2.6 for a listing of the locations, conditions, and quantities for each asbestos-containing material.

HAN Number	Material Description	Comments
PIPE INSULATION (400s)		
400	Tar Coating on Foam Pipe Insulation	Photo #1
MISCELLANEOUS (600s)		
609	Foundation Tar	---
611	Hand Wheel Actuator Gasket	Photo #2

2.4 Assumed Asbestos-Containing Suspect Materials

The following materials have been identified as suspect asbestos-containing materials, but have not been analyzed. These materials must be assumed to be asbestos-containing until such time that sampling and analysis proves that the material contains 1% asbestos or less.

HAN Number	Material Description	Comments
MISCELLANEOUS (600s)		
602	Pump Motor Control – Electrical Components	Note 2 Photo #3
604	Pump Wiring	Note 2 Photo #4
605	Wax Paper Whip Wire Insulation	Note 2 Photo #5
610	Exterior Electrical Cabinet Components	Note 2 Photo #6

2.5 Confirmed Non-Asbestos Containing Materials

These materials were sampled and analyzed by current EPA AHERA and ELAP protocols and were proven to contain one percent asbestos or less (≤1%).

HAN Number	Material Description	Comments
CEILINGS (200s)		
200	2'x4' Dot + Fissure Acoustical Ceiling Tile	---
FLOORS (300s)		
300.1	2"x2" Ceramic Floor Tile Grout	---
300.2	2"x2" Ceramic Floor Tile Mudset	---
MISCELLANEOUS (600s)		
600	Flange Gasket, Large	---
601	Centrifugal Pump Gasket	---
606	Interior Window Glazing Compound, White	Trace, <1% Asbestos
607	Exterior Door Caulk, Grey	---
608	Concrete Louver Guard Caulk, Beige	---
612	Coping Stone Caulk	---
613	Concrete Ceiling Seam Tar	---
614	Addition Roof Caulk, White	---
ROOFING (700s)		
700.3	Tar Moisture Barrier	---
700.4	Gypsum Insulation	---
701.3	Tar Vapor Barrier	---
702	Flashing Tar	Trace, <1% Asbestos
703.5	Tar Vapor Barrier	Trace, <1% Asbestos

2.6 Summary Table of Asbestos-Containing Materials

The following table summarizes the functional spaces that were included in the inspection and contain materials which were verified or assumed to be asbestos-containing materials.

Functional Space ID/ Description	HAN	Material Description	ACM	Approximate Quantity	Condition	Friability
001 – Basement Level	400	Tar Coating on Foam Pipe Insulation	Yes	534 LF	Intact	Non-Friable
	611	Hand Wheel Actuator Gasket	Yes	110 SF*	Intact	Non-Friable
002 – Valve Chamber	400	Tar Coating on Foam Pipe Insulation	Yes	60 LF	Intact	Non-Friable
	611	Hand Wheel Actuator Gasket	Yes	15 SF*	Intact	Non-Friable
100 – Mech. Operating Room	602	Pump Motor Control – Electrical Components	Note 2	192 SF*	Intact	Non-Friable
	604	Pump Wiring	Note 2	400 LF Note 3	Intact	Non-Friable
101 – Bathroom	605	Wax Paper Whip Wire Insulation	Note 2	8 LF	Intact	Non-Friable
200 – Exterior Elevations	609	Foundation Tar	Yes	3,600 SF Note 3	Intact	Non-Friable

* HAN 602 was quantified as 48 SF per cabinet.
* HAN 611 was quantified as 1 SF per gasket, with 5 gaskets per assembly.

2.7 Inspection Notes

Note #	Description
1	Sampling and analysis of the following suspect asbestos containing materials observed within the project area that are not planned to be disturbed by renovations has not been conducted: • HAN603 Step-down Transformer Components within 100 – Mech. Operating Room • HAN610 Exterior Electric Cabinet Components within 200 – Exterior Elevations
2	Electrical components could not be de-energized at the time of the inspection. Material must be assumed to be an asbestos-containing material until such time that sampling and analysis proves that the material contains less than 1% asbestos.
3	Additional quantities may exist within internal, interstitial, or buried spaces that were inaccessible at the time of the inspection.

3 Lead-Based Paint Inspection

3.1 Methodology

Sienna Environmental Technologies used a spectrum analyzer (Refer to Appendix D for additional information) to test painted or coated surfaces included in the scope of work. The analyzer measures the amount of lead in painted surfaces using X-Ray Fluorescence technology (XRF). The analyzer uses a radioactive source which locates lead atoms in painted surfaces and measures the concentration in milligrams per square centimeter. If necessary, paint chip samples were also collected as part of this inspection. Representative surfaces/components were tested in a manner designed to adequately represent the different components, substrates, types of paint, construction and paint history. Various federal, state and local laws, rules, regulations and guidelines may be applicable to this project as it relates to Lead-Based Paint/coatings (LBP) including but not limited to:

1. Lead-Based Paint Renovation, Repair and Painting Regulation Rule (40 CFR Part 745.8 Subpart E (EPA))
2. Lead Safe Housing Rule (HUD 24 CFR Part 35)
3. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (US Department of Housing and Urban Development (HUD))
4. Occupational Safety and Health Administration (OSHA 29 CFR 1910 and 1926)
5. New York State Education Department (NYSED)
6. State of New York codes and laws
7. All local codes
8. All federal codes
9. US-DOT 49 CFR

The most recent edition of any relevant regulation, standard, document, or code shall be applicable to the work. Where conflict among the requirements exists, the most stringent requirements are generally applicable.

3.2 HUD/ EPA Standards

Certain HUD and EPA standards apply to "Lead-Based Paint" which is any paint or coating which contains lead at or above 1.0 mg/cm^2 (via XRF), or 0.5 percent by weight (paint chip). Analysis indicated that the following components have a lead content equal to or greater than the HUD/EPA standard for Lead-Based Paint:

3.3 Summary Table of Lead-Based Painted/Coated Materials

Functional Space ID/ Description	Material Description	Approximate Quantity	Condition	Positive or Homogeneous with Shot #
001 – Basement Level	Green Concrete Column	13	Poor	49
	Green Concrete Pipe Cradle	21	Poor	51
002 – Valve Chamber	Green Concrete Column Base	2	Poor	17
	Green Concrete Pipe Cradle	6	Poor	17
100 – Mech. Operating Floor	Beige Concrete Centrifugal Pump Curb	4	Poor	28
	Beige Concrete Motor Control Center Curb	1	Poor	38
	Blue Metal Centrifugal Pump Pipe	14 LF x 3 Pumps	Intact	22
	Yellow Glazed Block Wall	Throughout	Intact	19
	Yellow Metal Crane Hoist	1	Intact	43
101 – Bathroom	Yellow Glazed Block Wall	Throughout	Intact	19
102 – Storage/ Old Vestibule	Metal Floor Drain, Patina	1	Intact	77
103 – Storage/ Chlorine Scale Room	Green Metal Scale	1	Poor	82
	Orange Glazed Block Wall	Throughout	Intact	80
104 – Storage/ Old Chlorinator Room	Blue Glazed Block Wall	Throughout	Intact	84
200 – Exterior Elevations	No Lead-Based Painted/Coated components were detected within the scope of work.			
300 – R1 Main Roof	No Lead-Based Painted/Coated components were detected within the scope of work.			
301 – R2 Lower Roof	No Lead-Based Painted/Coated components were detected within the scope of work.			
302 – R3 Valve Chamber roof	No Lead-Based Painted/Coated components were detected within the scope of work.			

The presence of lead in surfaces that were analyzed as less than 0.5 percent lead by weight or in measurable amounts but less than 1.0 mg/cm^2 is a consideration for the purposes of complying with OSHA regulations. Refer to Section 3.4 for details.

3.4 OSHA Regulations

On May 4, 1993, OSHA promulgated the Lead Exposure in Construction Rule (29 CFR Part 1926.62). This regulation applies to all construction activities involving potential lead exposures. This regulation applies when lead is present in any detectible amount and is not limited to HUD's definition of Lead-Based Paint. Surface abrading and demolition activities may release lead from unpainted materials which contain lead such as glazed ceramic tile and porcelain, or enameled wall panels. Although these items do not meet HUD's definition of Lead-Based Paint and need not be included in disclosure under the Lead Disclosure Rule (Refer to Section 3.5), they have been included for reference in Section 3.3 above.

3.5 Disclosure Requirements

If the subject property of this report is target housing, the owner has certain responsibilities under the Lead Disclosure Rule when the property is being sold or leased, or when a lease is being renewed with revisions. In general, lead disclosure is required in these circumstances, except that disclosure does not have to be made when the target housing is being leased if the inspection has found that it is Lead-Based Paint free.

Per 40 CFR Part 745 “Target Housing” is defined as: any housing constructed prior to 1978, except housing for the elderly or persons with disabilities (unless any child who is less than 6 years of age resides or is expected to reside in such housing); or any 0-bedroom dwelling.

Results of this inspection must be provided to new lessees (tenants) and prospective buyers of this property under Federal law (24 CFR part 35 and 40 CFR part 745) before they become obligated under a lease or sales contract. The complete report must be provided by the owner to prospective buyers and it must be made available to prospective tenants and to renewing tenants if they have not been provided the information previously. The Inspector’s plain language summary of the report must be provided to the client (e.g., property owner or manager) when the complete report is provided. The landlord (lessor) or seller is also required to distribute an educational pamphlet approved by the U.S. Environmental Protection Agency and include the Lead Warning Statement in the lease or sale contracts to ensure that parents have the information they need to protect their children from Lead-Based Paint hazards. Complete disclosure requires the landlord/sellers and renters/buyers (and their agents) to sign and date an acknowledgement that the required information and materials were provided and received. Also, prospective buyers must be provided the opportunity to have their own Lead-Based Paint inspection, lead hazard screen or risk assessment performed before the purchase agreement is signed; the standard period is 10 days, but this period may be changed or waived by agreement between the seller and prospective buyer. EPA regulations require the inspector to keep the inspection report for at least 3 years. (See Section IV of Chapter 7 of the HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing for further details; see www.hud.gov/lead.)

Appendix A

General Conditions of Inspection

1. Sienna Environmental Technologies, LLC neither accepts nor implies any liability for the implementation of the recommendations found within this report.

2. This inspection was limited to areas accessible to the inspector. Sienna Environmental Technologies, LLC neither accepts nor implies any liability for hazardous materials that may be present in other areas of the building.

3. The results of the laboratory analytical reports that may be contained herein are the product of the knowledge, experience and expertise of the laboratory retained to perform such services. Sienna Environmental Technologies neither accepts nor implies any liability for sample analysis reports compiled by others.

4. This report is based on the condition and contents present at the site on the day of the inspection. Sienna Environmental Technologies, LLC is not liable for materials, chemicals or other substances of concern that may have been removed from the site, cleaned or disposed of prior to the inspection date or subsequent to that date.

5. An inspection for Asbestos-Containing Materials, Lead-Based Paint or PCB-Containing Materials relies heavily upon identification of homogeneous areas, with subsequent sampling and laboratory analysis determined by: the quantity of surfaces identified, generally accepted inspection protocols, regulatory requirements, and the inspector's judgment. Specific sample locations are determined with the objective of selecting representative samples. As with any type of sampling, the possibility of obtaining a false positive or false negative does exist, is inherent in the sampling process, and can at times result from the uneven distribution of target analytes within the suspect material. The comprehensive inspection protocol developed and utilized by Sienna Environmental Technologies, LLC attempts to minimize the risk of a false positive or false negative result. However, the client is advised that the risk of false positives or false negatives cannot be completely eliminated.

SIENNA
ENVIRONMENTAL TECHNOLOGIES

Appendix B

Certifications and Licenses

New York State – Department of Labor
Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

ASBESTOS HANDLING LICENSE

Sienna Environmental Technologies LLC

350 Elmwood Avenue

Buffalo, NY 14222

FILE NUMBER: 00-1037
LICENSE NUMBER: 29432
LICENSE CLASS: RESTRICTED
DATE OF ISSUE: 02/08/2018
EXPIRATION DATE: 02/28/2019

Duly Authorized Representative – Susanne Kelley:

This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with regard to the conduct of an asbestos project, or (2) demonstrated lack of responsibility in the conduct of any job involving asbestos or asbestos material.

This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.

Eileen M. Franko, Director
For the Commissioner of Labor

SH 432 (8/12)

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE

N.Y.S

JOSHUA J DUFFY
CLASS(EXPIRES)
C ATEC(11/18) D INSP(11/18)
H PM (11/18)

CERT# 13-13078
DMV# 102128202

MUST BE CARRIED ON ASBESTOS PROJECTS

01213 004526737 40

EYES BRO
HAIR BRO
HGT 5' 11"

IF FOUND RETURN TO:
NYSDOL - L&C UNIT
ROOM 161A BUILDING 12
STATE OFFICE CAMPUS
ALBANY NY 12240

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2019
Issued April 01, 2018

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

DR. THOMAS R. MCKEE
AMERISCI RICHMOND
13635 GENITO RD
MIDLOTHIAN, VA 23112

NY Lab Id No: 10984

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous

Asbestos in Friable Material	Item 198.1 of Manual
	EPA 600/M4/82/020
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)
Asbestos in Non-Friable Material-TEM	Item 198.4 of Manual
Asbestos-Vermiculite-Containing Material	Item 198.8 of Manual

Serial No.: 57653

SIENNA
ENVIRONMENTAL TECHNOLOGIES

Appendix C

Chains of Custody and Laboratory Reports

Please Reply To:

AmeriSci Richmond
13635 GENITO ROAD
MIDLOTHIAN, VIRGINIA 23112
TEL: (804) 763-1200 • FAX: (804) 763-1800

FACSIMILE TELECOPY TRANSMISSION

To:	Susanne Kelley Sienna Environmental Technologies, LLC	**From:**	Jean L. Mayes
		AmeriSci Job #:	118121183
Fax #:		**Subject:**	ELAP-PLM/TEM 3 day Results
		Client Project:	3368; GHD/Matthew Skuse; Erie County Water Authority- Guenther Pump Station; 3
Email:	labresults@siennaet.com		

Date: Tuesday, January 08, 2019
Time: 11:53:04
Comments:

Number of Pages: _____ (including cover sheet)

Client Name: Sienna Environmental Technologies, LLC

Table I
Summary of Bulk Asbestos Analysis Results

3368; GHD/Matthew Skuse; Erie County Water Authority- Guenther Pump Station; 3478 Pleasant Avenue, Hamburg, NY (Report Amended 1/8/2019)

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
01	120418-3368-200-1	200	0.281	2.4	42.5	55.1	NAD	NAD
Location:	2'x4' Dot + Fissure Acoustical Ceiling Tile; 101							
02	120418-3368-200-2	200	0.189	1.3	44.5	54.2	NAD	NAD
Location:	2'x4' Dot + Fissure Acoustical Ceiling Tile; 101							
03	120418-3368-300.1-1	300.1	----	----	----	----	NAD	NA
Location:	2"x2" Ceramic Floor Tile Grout; 101							
04	120418-3368-300.1-2	300.1	----	----	----	----	NAD	NA
Location:	2"x2" Ceramic Floor Tile Grout; 101							
05	120418-3368-300.2-1	300.2	----	----	----	----	NAD	NA
Location:	2"x2" Ceramic Floor Tile Mudset; 101							
06	120418-3368-300.2-2	300.2	----	----	----	----	NAD	NA
Location:	2"x2" Ceramic Floor Tile Mudset; 101							
07	120418-3368-400-1	400	0.162	74.3	3.2	17.0	Chrysotile 5.7	NA
Location:	Tar Coating On Foam Pipe Insulation; 001							
08	120418-3368-400-2	400	0.189	72.7	3.4	24.0	NA/PS	NA
Location:	Tar Coating On Foam Pipe Insulation; 001							
09	120418-3368-600-1	600	0.119	94.0	5.9	0.1	NAD	NAD
Location:	Flange Gasket - Large; 100							
10	120418-3368-600-2	600	0.143	93.6	5.1	1.3	NAD	NAD
Location:	Flange Gasket - Large; 100							
11	120418-3368-601-1	601	0.069	94.0	5.4	0.6	NAD	NAD
Location:	Centrifugal Pump Gasket; 100							
12	120418-3368-601-2	601	0.094	95.1	1.8	3.1	NAD	NAD
Location:	Centrifugal Pump Gasket; 100							
13	120418-3368-606-1	606	0.286	16.3	81.8	1.8	Chrysotile <0.25	Chrysotile Trace
Location:	Interior Window Glazing Compound - White; 100							
14	120418-3368-606-2	606	0.279	14.9	82.0	3.0	Chrysotile <0.25	Chrysotile Trace
Location:	Interior Window Glazing Compound - White; 100							
15	120418-3368-611-1	611	0.208	31.2	12.4	11.3	Chrysotile 45.1	NA
Location:	Hand Wheel Actuator Gasket; 001							
16	120418-3368-611-2	611	0.315	27.4	10.1	62.5	NA/PS	NA
Location:	Hand Wheel Actuator Gasket; 001							

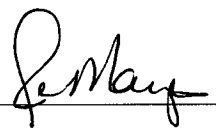
See Reporting notes on last page

Client Name: Sienna Environmental Technologies, LLC

Table I
Summary of Bulk Asbestos Analysis Results

3368; GHD/Matthew Skuse; Erie County Water Authority- Guenther Pump Station; 3478 Pleasant Avenue, Hamburg, NY (Report Amended 1/8/2019)

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
17	120418-3368-612-1	612	0.298	39.5	56.3	4.1	NAD	NAD
Location:	Coping Stone Caulk; R-1							
18	120418-3368-612-2	612	0.275	35.7	59.7	4.6	NAD	NAD
Location:	Coping Stone Caulk; R-1							
19	120418-3368-700.3-1	700.3	0.332	85.1	3.5	11.4	NAD	NAD
Location:	Tar Moisture Barrier; R-1							
20	120418-3368-700.3-2	700.3	0.247	85.7	3.5	10.9	NAD	NAD
Location:	Tar Moisture Barrier; R-1							
21	120418-3368-700.4-1	700.4	0.197	12.1	50.2	37.7	NAD	NA
Location:	Gypsum Insulation; R-1							
22	120418-3368-700.4-2	700.4	0.380	14.8	27.6	57.7	NAD	NA
Location:	Gypsum Insulation; R-1							

TEM Analyzed By: Jean L. Mayes  Date Analyzed: 12/8/2018 Reviewed By:  Date Reviewed: 12/8/2018

Semi-Quantitative Analysis: NAD = no asbestos detected; NA = not analyzed; NA/PS = not analyzed due to positive stop; Trace = <1%;
PLM analysis by EPA 600/R-93/116 per 40 CFR 763 (NVLAP Lab Code 101904-0) or NY ELAP 198.1 for New York friable samples which includes quantitation of any vermiculite observed (198.6 for NOB samples) or EPA 400 pt ct by EPA 600/M4-82-020 (NY ELAP Lab # 10984);
TEM prep by EPA 600/R-93/116 Section 2.3 (analysis by Section 2.5, not covered by NVLAP Bulk accreditation); or NY ELAP 198.4 for New York NOB samples (NY ELAP Lab # 10984);

** Warning Notes: Consider PLM fiber diameter limitation, only TEM will resolve fibers <0.25 micrometers in diameter. TEM bulk analysis is representative of the fine grained matrix material and may not be representative of non-uniformly dispersed debris, soils or other heterogeneous materials for which a combination PLM/TEM evaluation is recommended; Quantitation for beginning weights of <0.1 grams should be considered as qualitative only.

AmeriSci Richmond
13635 GENITO ROAD
MIDLOTHIAN, VIRGINIA 23112
TEL: (804) 763-1200 • FAX: (804) 763-1800

PLM Bulk Asbestos Report

Sienna Environmental Technologies, LL
Attn: Susanne Kelley
350 Elmwood Ave

Buffalo, NY 14222

Date Received 12/06/18 **AmeriSci Job #** 118121183
Date Examined 12/07/18 **P.O. #**
ELAP # 10984 **Page** 1 **of** 5
RE: 3368; GHD/Matthew Skuse; Erie County Water Authority-Guenther Pump Station; 3478 Pleasant Avenue, Hamburg, NY (Report Amended 1/8/2019)

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
120418-3368-200-1 200 **Location:** 2'x4' Dot + Fissure Acoustical Ceiling Tile; 101	118121183-01	***No***	NAD (by NYS ELAP 198.6) by William M. Dunstan on 12/07/18
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 55.1 % **Comment:** Heat Sensitive (organic): 2.4%; Acid Soluble (inorganic): 42.5%; Inert (Non-asbestos): 55.1%			
120418-3368-200-2 200 **Location:** 2'x4' Dot + Fissure Acoustical Ceiling Tile; 101	118121183-02	***No***	NAD (by NYS ELAP 198.6) by William M. Dunstan on 12/07/18
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 54.2 % **Comment:** Heat Sensitive (organic): 1.3%; Acid Soluble (inorganic): 44.5%; Inert (Non-asbestos): 54.2%			
120418-3368-300.1-1 300.1 **Location:** 2"x2" Ceramic Floor Tile Grout; 101	118121183-03	***No***	NAD (by NYS ELAP 198.1) by William M. Dunstan on 12/07/18
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
120418-3368-300.1-2 300.1 **Location:** 2"x2" Ceramic Floor Tile Grout; 101	118121183-04	***No***	NAD (by NYS ELAP 198.1) by William M. Dunstan on 12/07/18
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

3368; GHD/Matthew Skuse; Erie County Water Authority-
Guenther Pump Station; 3478 Pleasant Avenue, Hamburg, NY
(Report Amended 1/8/2019)

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
120418-3368-300.2-1	118121183-05	***No***	NAD
300.2	**Location:** 2"x2" Ceramic Floor Tile Mudset; 101		(by NYS ELAP 198.1) by William M. Dunstan on 12/07/18
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Cementitious, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
120418-3368-300.2-2	118121183-06	***No***	NAD
300.2	**Location:** 2"x2" Ceramic Floor Tile Mudset; 101		(by NYS ELAP 198.1) by William M. Dunstan on 12/07/18
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Cementitious, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
120418-3368-400-1	118121183-07	***Yes***	5.7 %
400	**Location:** Tar Coating On Foam Pipe Insulation; 001		(by NYS ELAP 198.6) by William M. Dunstan on 12/07/18
Analyst Description: Black, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types: Chrysotile 5.7 %			
Other Material: Non-fibrous 17 %			
Comment: Heat Sensitive (organic): 74.3%; Acid Soluble (inorganic): 3.2%; Inert (Non-asbestos): 17.0%			
120418-3368-400-2	118121183-08		NA/PS
400	**Location:** Tar Coating On Foam Pipe Insulation; 001		
Analyst Description: Bulk Material			
Asbestos Types:			
Other Material:			
Comment: Heat Sensitive (organic): 72.7%; Acid Soluble (inorganic): 3.4%; Inert (Non-asbestos): 24.0%			
120418-3368-600-1	118121183-09	***No***	NAD
600	**Location:** Flange Gasket - Large; 100		(by NYS ELAP 198.6) by William M. Dunstan on 12/07/18
Analyst Description: Brown, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 0.1 %			
Comment: Heat Sensitive (organic): 94.0%; Acid Soluble (inorganic): 5.9%; Inert (Non-asbestos): 0.1%			

See Reporting notes on last page

PLM Bulk Asbestos Report

3368; GHD/Matthew Skuse; Erie County Water Authority-
Guenther Pump Station; 3478 Pleasant Avenue, Hamburg, NY
(Report Amended 1/8/2019)

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
120418-3368-600-2	118121183-10	***No***	NAD
600	**Location:** Flange Gasket - Large; 100		(by NYS ELAP 198.6) by William M. Dunstan on 12/07/18

Analyst Description: Brown, Heterogeneous, Non-Fibrous, Bulk Material
Asbestos Types:
Other Material: Non-fibrous 1.3 %
Comment: Heat Sensitive (organic): 93.6%; Acid Soluble (inorganic): 5.1%; Inert (Non-asbestos): 1.3%

120418-3368-601-1	118121183-11	***No***	NAD
601	**Location:** Centrifugal Pump Gasket; 100		(by NYS ELAP 198.6) by William M. Dunstan on 12/07/18

Analyst Description: Brown, Heterogeneous, Non-Fibrous, Bulk Material
Asbestos Types:
Other Material: Non-fibrous 0.6 %
Comment: Heat Sensitive (organic): 94.0%; Acid Soluble (inorganic): 5.4%; Inert (Non-asbestos): 0.6%

120418-3368-601-2	118121183-12	***No***	NAD
601	**Location:** Centrifugal Pump Gasket; 100		(by NYS ELAP 198.6) by William M. Dunstan on 12/07/18

Analyst Description: Brown, Heterogeneous, Non-Fibrous, Bulk Material
Asbestos Types:
Other Material: Non-fibrous 3.1 %
Comment: Heat Sensitive (organic): 95.1%; Acid Soluble (inorganic): 1.8%; Inert (Non-asbestos): 3.1%

120418-3368-606-1	118121183-13	***Yes***	Trace (<0.25 % pc)
606	**Location:** Interior Window Glazing Compound - White; 100		(EPA 400 PC) by William M. Dunstan on 12/07/18

Analyst Description: White, Heterogeneous, Non-Fibrous, Bulk Material
Asbestos Types: Chrysotile <0.25 % pc
Other Material: Non-fibrous 1.9 %
Comment: Heat Sensitive (organic): 16.3%; Acid Soluble (inorganic): 81.8%; Inert (Non-asbestos): 1.9%

120418-3368-606-2	118121183-14	***Yes***	Trace (<0.25 % pc)
606	**Location:** Interior Window Glazing Compound - White; 100		(EPA 400 PC) by William M. Dunstan on 12/07/18

Analyst Description: White, Heterogeneous, Non-Fibrous, Bulk Material
Asbestos Types: Chrysotile <0.25 % pc
Other Material: Non-fibrous 3.1 %
Comment: Heat Sensitive (organic): 14.9%; Acid Soluble (inorganic): 82.0%; Inert (Non-asbestos): 3.1%

See Reporting notes on last page

PLM Bulk Asbestos Report

3368; GHD/Matthew Skuse; Erie County Water Authority-
Guenther Pump Station; 3478 Pleasant Avenue, Hamburg, NY
(Report Amended 1/8/2019)

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
120418-3368-611-1	118121183-15	***Yes***	45.1 %
611	**Location:** Hand Wheel Actuator Gasket; 001		(by NYS ELAP 198.6) by William M. Dunstan on 12/07/18

Analyst Description: Gray, Heterogeneous, Non-Fibrous, Bulk Material
Asbestos Types: Chrysotile 45.1 %
Other Material: Non-fibrous 11.3 %
Comment: Heat Sensitive (organic): 31.2%; Acid Soluble (inorganic): 12.4%; Inert (Non-asbestos): 11.3%

120418-3368-611-2	118121183-16		NA/PS
611	**Location:** Hand Wheel Actuator Gasket; 001		

Analyst Description: Bulk Material
Asbestos Types:
Other Material:
Comment: Heat Sensitive (organic): 27.4%; Acid Soluble (inorganic): 10.1%; Inert (Non-asbestos): 62.5%

120418-3368-612-1	118121183-17	***No***	NAD
612	**Location:** Coping Stone Caulk; R-1		(by NYS ELAP 198.6) by William M. Dunstan on 12/07/18

Analyst Description: Gray, Heterogeneous, Non-Fibrous, Bulk Material
Asbestos Types:
Other Material: Non-fibrous 4.1 %
Comment: Heat Sensitive (organic): 39.5%; Acid Soluble (inorganic): 56.3%; Inert (Non-asbestos): 4.1%

120418-3368-612-2	118121183-18	***No***	NAD
612	**Location:** Coping Stone Caulk; R-1		(by NYS ELAP 198.6) by William M. Dunstan on 12/07/18

Analyst Description: Gray, Heterogeneous, Non-Fibrous, Bulk Material
Asbestos Types:
Other Material: Non-fibrous 4.6 %
Comment: Heat Sensitive (organic): 35.7%; Acid Soluble (inorganic): 59.7%; Inert (Non-asbestos): 4.6%

120418-3368-700.3-1	118121183-19	***No***	NAD
700.3	**Location:** Tar Moisture Barrier; R-1		(by NYS ELAP 198.6) by William M. Dunstan on 12/07/18

Analyst Description: Black, Heterogeneous, Non-Fibrous, Bulk Material
Asbestos Types:
Other Material: Non-fibrous 11.4 %
Comment: Heat Sensitive (organic): 85.1%; Acid Soluble (inorganic): 3.5%; Inert (Non-asbestos): 11.4%

See Reporting notes on last page

PLM Bulk Asbestos Report

3368; GHD/Matthew Skuse; Erie County Water Authority-
Guenther Pump Station; 3478 Pleasant Avenue, Hamburg, NY
(Report Amended 1/8/2019)

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
120418-3368-700.3-2	118121183-20	***No***	NAD
700.3 **Location:** Tar Moisture Barrier; R-1			(by NYS ELAP 198.6) by William M. Dunstan on 12/07/18
Analyst Description: Black, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 10.9 %			
Comment: Heat Sensitive (organic): 85.7%; Acid Soluble (inorganic): 3.5%; Inert (Non-asbestos): 10.9%			
120418-3368-700.4-1	118121183-21	***No***	NAD [1]
700.4 **Location:** Gypsum Insulation; R-1			(by NYS ELAP 198.6) by William M. Dunstan on 12/07/18
Analyst Description: White, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 7.7 %, Vermiculite 30 %			
Comment: Heat Sensitive (organic): 12.1%; Acid Soluble (inorganic): 50.2%; Inert (Non-asbestos): 37.7%			
120418-3368-700.4-2	118121183-22	***No***	NAD [1]
700.4 **Location:** Gypsum Insulation; R-1			(by NYS ELAP 198.6) by William M. Dunstan on 12/07/18
Analyst Description: White, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 12.7 %, Vermiculite 45 %			
Comment: Heat Sensitive (organic): 14.8%; Acid Soluble (inorganic): 27.6%; Inert (Non-asbestos): 57.7%			

Reporting Notes:

(1) Matrix reduced quantitatively by ashing at 480C and HCl treatments prior to PLM analysis per EPA/600/R-93/116.

Analyzed by: William M. Dunstan Wm Dunstan Date: 12/7/2018 Reviewed by: Wm Dunstan

*NAD = no asbestos detected, Detection Limit <1%, Reporting Limits: CVES = 1%, 400 Pt Ct = 0.25%, 1000 Pt Ct = 0.1%; "Present" or NVA = "No Visible Asbestos" are observations made during a qualitative analysis; NA = not analyzed; NA/PS = not analyzed / positive stop; PLM Bulk Asbestos Analysis by EPA 600/R-93/116 per 40 CFR 763 (NVLAP Lab Code 101904-0) and ELAP PLM Analysis Protocol 198.1 for New York friable samples which includes quantitation of any vermiculite observed (198.6 for NOB samples) or EPA 400 pt ct by EPA 600/M4-82-020 (NYSDOH ELAP Lab # 10984); CA ELAP Lab # 2508; Note: PLM is not consistently reliable in detecting asbestos in floor coverings and similar NOB materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos-containing in New York State (also see EPA Advisory for floor tile, FR 59, 146, 38970, 8/1/94). This PLM report relates ONLY to the items tested.

Subject: AmeriSci# 118121183 Rev
From: Eric Rayner <erayner@siennaet.com>
Date: 1/8/2019 8:09 AM
To: Tiffany Goodwyn <tgoodwyn@amerisci.com>
CC: Carson Cain <ccain@siennaet.com>

118-12-1183

Good morning Tiff,

Would you be able to revise the building address on the report? Apparently we accidentally recorded the address for the admin offices.

The site is actually: **3478 Pleasant Avenue, Hamburg, NY**

Thanks,
Eric Rayner
Project Manager
SIENNA
350 Elmwood Ave., Buffalo, NY 14222
Ⓟ 716.332.3134 x306
© 585.297.0651
81 Fall St., Seneca Falls, NY 13148

Attachments:

20181204 SET3368 PLM TEM.pdf	378 KB

Chain of Custody Document

118121183

SIENNA
ENVIRONMENTAL TECHNOLOGIES

350 Ensminger Ave. • Buffalo, NY 14223
(P) 716.332.3134 (F) 716.332.5114

Fax/Email Report to: Labresults@Siennaet.com

Client/Contact:	GHD Matthew Skuse	**Turn Around Time** (Bordered/Circled)
Building/Location:	Erie County Water Authority- Guenther Pump Station 295 Main Street #350- Buffalo, NY	RUSH 24 Hour 48 Hour 72 Hour 5 Day
Job #: 3368	**Total # Samples:** 22	

PLM: x **TEM:** x **AAS:** _____ **Other:** _____

Sample #				Description of Sample	Location of Sample	Notes
Date	Job	HAN	ID#			
12/4/18	3368	200	1	2'x4' Dot + Fissure Acoustical Ceiling Tile	101	
12/4/18	3368	200	2	2'x4' Dot + Fissure Acoustical Ceiling Tile	101	
12/4/18	3368	300.1	1	2" x 2" Ceramic Floor Tile Grout	101	
12/4/18	3368	300.1	2	2" x 2" Ceramic Floor Tile Grout	101	
12/4/18	3368	300.2	1	2" x 2" Ceramic Floor Tile Mudset	101	
12/4/18	3368	300.2	2	2" x 2" Ceramic Floor Tile Mudset	101	
12/4/18	3368	400	1	Tar Coating on Foam Pipe Insulation	001	
12/4/18	3368	400	2	Tar Coating on Foam Pipe Insulation	001	
12/4/18	3368	600	1	Flange Gasket- Large	100	
12/4/18	3368	600	2	Flange Gasket- Large	100	
12/4/18	3368	601	1	Centrifugal Pump Gasket	100	
12/4/18	3368	601	2	Centrifugal Pump Gasket	100	
12/4/18	3368	606	1	Interior Window Glazing Compound-White	100	
12/4/18	3368	606	2	Interior Window Glazing Compound-White	100	
12/4/18	3368	611	1	Hand Wheel Actuator Gasket	001	
12/4/18	3368	611	2	Hand Wheel Actuator Gasket	001	
12/4/18	3368	612	1	Coping Stone Caulk	R-1	
12/4/18	3368	612	2	Coping Stone Caulk	R-1	
12/4/18	3368	700.3	1	Tar Moisture Barrier	R-1	
12/4/18	3368	700.3	2	Tar Moisture Barrier	R-1	
12/4/18	3368	700.4	1	Gypsum Insulation	R-1	
12/4/18	3368	700.4	2	Gypsum Insulation	R-1	

Notes:

Yes	No	
x		Negative PLM to TEM per ELAP protocols
x		Positive Stop by HAN.ID#
	x	Layered analysis is expected - Sample HAN-ID# :

RECEIVED
DEC 06 2018
By

Sampled By: Josh Duffy Date: 12/4/2018

Relinquished By: Carson Cain Date: 12/4/2018

Received By: _____ Date: _____

Please Reply To:

AmeriSci Richmond
13635 GENITO ROAD
MIDLOTHIAN, VIRGINIA 23112
TEL: (804) 763-1200 • FAX: (804) 763-1800

FACSIMILE TELECOPY TRANSMISSION

To:	Susanne Kelley Sienna Environmental Technologies, LLC	**From:**	Cory M. Parnell
		AmeriSci Job #:	118121813
Fax #:		**Subject:**	ELAP-PLM/TEM 3 day Results
		Client Project:	SET 3368; GHD/Matthew Skuse; Erie County Water Authority - Guenther Pump Stati
Email:	labresults@siennaet.com		

Date: Saturday, December 29, 2018
Time: 09:42:29
Comments:

Number of Pages: 9 (including cover sheet)

Client Name: Sienna Environmental Technologies, LLC

Table I
Summary of Bulk Asbestos Analysis Results

SET 3368; GHD/Matthew Skuse; Erie County Water Authority - Guenther Pump Station

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
01	122018-3368-607-1	607	0.399	46.9	42.5	10.6	NAD	NAD
Location:	Exterior Door Caulk, Grey; Exterior West							
02	122018-3368-607-2	607	0.419	42.2	46.7	11.1	NAD	NAD
Location:	Exterior Door Caulk, Grey; Exterior West							
03	122018-3368-608-1	608	0.236	74.7	16.8	8.5	NAD	NAD
Location:	Concrete Louver Guard Caulk, Beige; Exterior South							
04	122018-3368-608-2	608	0.208	73.1	17.7	9.2	NAD	NAD
Location:	Concrete Louver Guard Caulk, Beige; Exterior South							
05	122018-3368-609-1	609	0.328	53.5	4.8	35.0	Chrysotile 6.7	NA
Location:	Foundation Tar; Exterior South							
06	122018-3368-609-2	609	0.188	50.6	7.5	41.9	NA/PS	NA
Location:	Foundation Tar; Exterior South							
07	122018-3368-613-1	613	0.290	70.1	10.2	19.7	NAD	NAD
Location:	Concrete Ceiling, Seam Tar; 002							
08	122018-3368-613-2	613	0.225	60.5	9.5	30.0	NAD	NAD
Location:	Concrete Ceiling, Seam Tar; 002							
09	122018-3368-614-1	614	0.316	74.0	17.7	8.3	NAD	NAD
Location:	Addition Roof Caulk, White; R-2							
10	122018-3368-614-2	614	0.325	73.7	18.1	8.2	NAD	NAD
Location:	Addition Roof Caulk, White; R-2							
11	122018-3368-701.3-1	701.3	0.466	95.3	1.1	3.6	NAD	NAD
Location:	Tar Vapor Barrier; R-2							
12	122018-3368-701.3-2	701.3	0.450	89.7	2.3	8.0	NAD	NAD
Location:	Tar Vapor Barrier; R-2							
13	122018-3368-702-1	702	0.278	85.6	1.4	12.8	NAD	Chrysotile Trace
Location:	Flashing Tar; R-2							
14	122018-3368-702-2	702	0.186	85.1	4.7	10.1	NAD	Chrysotile Trace
Location:	Flashing Tar; R-2							
15	122018-3368-703.5-1	703.5	0.179	90.4	0.1	9.5	NAD	NAD
Location:	Tar Vapor Barrier; R-3							
16	122018-3368-703.5-2	703.5	0.267	89.7	0.4	9.8	NAD	Chrysotile Trace
Location:	Tar Vapor Barrier; R-3							

See Reporting notes on last page

Client Name: Sienna Environmental Technologies, LLC

Table I
Summary of Bulk Asbestos Analysis Results

SET 3368; GHD/Matthew Skuse; Erie County Water Authority - Guenther Pump Station

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM

TEM Analyzed By: Cory M. Parnell Date Analyzed: 12/29/2018 Reviewed By: Date Reviewed: 12/29/2018

Semi-Quantitative Analysis: NAD = no asbestos detected; NA = not analyzed; NA/PS = not analyzed due to positive stop; Trace = <1%;
PLM analysis by EPA 600/R-93/116 per 40 CFR 763 (NVLAP Lab Code 101904-0) or NY ELAP 198.1 for New York friable samples which includes quantitation of any vermiculite observed (198.6 for NOB samples) or EPA 400 pt ct by EPA 600/M4-82-020 (NY ELAP Lab # 10984);
TEM prep by EPA 600/R-93/116 Section 2.3 (analysis by Section 2.5, not covered by NVLAP Bulk accreditation); or NY ELAP 198.4 for New York NOB samples (NY ELAP Lab # 10984);

** Warning Notes: Consider PLM fiber diameter limitation, only TEM will resolve fibers <0.25 micrometers in diameter. TEM bulk analysis is representative of the fine grained matrix material and may not be representative of non-uniformly dispersed debris, soils or other heterogeneous materials for which a combination PLM/TEM evaluation is recommended; Quantitation for beginning weights of <0.1 grams should be considered as qualitative only.

AmeriSci Richmond
13635 GENITO ROAD
MIDLOTHIAN, VIRGINIA 23112
TEL: (804) 763-1200 • FAX: (804) 763-1800

PLM Bulk Asbestos Report

Sienna Environmental Technologies, LL
Attn: Susanne Kelley
350 Elmwood Ave

Buffalo, NY 14222

Date Received 12/27/18 **AmeriSci Job #** 118121813
Date Examined 12/28/18 **P.O. #**
ELAP # 10984 **Page** 1 **of** 4
RE: SET 3368; GHD/Matthew Skuse; Erie County Water Authority - Guenther Pump Station

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
122018-3368-607-1	118121813-01	*No*	NAD
607	**Location:** Exterior Door Caulk, Grey; Exterior West		(by NYS ELAP 198.6) by J. Samuel Baird on 12/28/18
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 10.6 %			
Comment: Heat Sensitive (organic): 46.9%; Acid Soluble (inorganic): 42.5%; Inert (Non-asbestos): 10.6%			
122018-3368-607-2	118121813-02	*No*	NAD
607	**Location:** Exterior Door Caulk, Grey; Exterior West		(by NYS ELAP 198.6) by J. Samuel Baird on 12/28/18
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 11.1 %			
Comment: Heat Sensitive (organic): 42.2%; Acid Soluble (inorganic): 46.7%; Inert (Non-asbestos): 11.1%			
122018-3368-608-1	118121813-03	*No*	NAD
608	**Location:** Concrete Louver Guard Caulk, Beige; Exterior South		(by NYS ELAP 198.6) by J. Samuel Baird on 12/28/18
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 8.5 %			
Comment: Heat Sensitive (organic): 74.7%; Acid Soluble (inorganic): 16.8%; Inert (Non-asbestos): 8.5%			
122018-3368-608-2	118121813-04	*No*	NAD
608	**Location:** Concrete Louver Guard Caulk, Beige; Exterior South		(by NYS ELAP 198.6) by J. Samuel Baird on 12/28/18
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 9.2 %			
Comment: Heat Sensitive (organic): 73.1%; Acid Soluble (inorganic): 17.7%; Inert (Non-asbestos): 9.2%			

See Reporting notes on last page

PLM Bulk Asbestos Report

SET 3368; GHD/Matthew Skuse; Erie County Water Authority - Guenther Pump Station

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
122018-3368-609-1	118121813-05	***Yes***	6.7 %
609 **Location:** Foundation Tar; Exterior South			(by NYS ELAP 198.6) by J. Samuel Baird on 12/28/18
Analyst Description: Black, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types: Chrysotile 6.7 %			
Other Material: Non-fibrous 35 %			
Comment: Heat Sensitive (organic): 53.5%; Acid Soluble (inorganic): 4.8%; Inert (Non-asbestos): 35.0%			
122018-3368-609-2	118121813-06		NA/PS
609 **Location:** Foundation Tar; Exterior South			
Analyst Description: Bulk Material			
Asbestos Types:			
Other Material:			
Comment: Heat Sensitive (organic): 50.6%; Acid Soluble (inorganic): 7.5%; Inert (Non-asbestos): 41.9%			
122018-3368-613-1	118121813-07	***No***	NAD
613 **Location:** Concrete Ceiling, Seam Tar; 002			(by NYS ELAP 198.6) by J. Samuel Baird on 12/28/18
Analyst Description: Black, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 19.7 %			
Comment: Heat Sensitive (organic): 70.1%; Acid Soluble (inorganic): 10.2%; Inert (Non-asbestos): 19.7%			
122018-3368-613-2	118121813-08	***No***	NAD
613 **Location:** Concrete Ceiling, Seam Tar; 002			(by NYS ELAP 198.6) by J. Samuel Baird on 12/28/18
Analyst Description: Black, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 30 %			
Comment: Heat Sensitive (organic): 60.5%; Acid Soluble (inorganic): 9.5%; Inert (Non-asbestos): 30.0%			
122018-3368-614-1	118121813-09	***No***	NAD
614 **Location:** Addition Roof Caulk, White; R-2			(by NYS ELAP 198.6) by J. Samuel Baird on 12/28/18
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 8.3 %			
Comment: Heat Sensitive (organic): 74.0%; Acid Soluble (inorganic): 17.7%; Inert (Non-asbestos): 8.3%			

See Reporting notes on last page

PLM Bulk Asbestos Report

SET 3368; GHD/Matthew Skuse; Erie County Water Authority - Guenther Pump Station

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
122018-3368-614-2	118121813-10	*No*	NAD (by NYS ELAP 198.6) by J. Samuel Baird on 12/28/18
614	**Location:** Addition Roof Caulk, White; R-2		

Analyst Description: Gray, Heterogeneous, Non-Fibrous, Bulk Material
Asbestos Types:
Other Material: Non-fibrous 8.2 %
Comment: Heat Sensitive (organic): 73.7%; Acid Soluble (inorganic): 18.1%; Inert (Non-asbestos): 8.2%

122018-3368-701.3-1	118121813-11	*No*	NAD (by NYS ELAP 198.6) by J. Samuel Baird on 12/28/18
701.3	**Location:** Tar Vapor Barrier; R-2		

Analyst Description: Black, Heterogeneous, Non-Fibrous, Bulk Material
Asbestos Types:
Other Material: Non-fibrous 3.6 %
Comment: Heat Sensitive (organic): 95.3%; Acid Soluble (inorganic): 1.1%; Inert (Non-asbestos): 3.6%

122018-3368-701.3-2	118121813-12	*No*	NAD (by NYS ELAP 198.6) by J. Samuel Baird on 12/28/18
701.3	**Location:** Tar Vapor Barrier; R-2		

Analyst Description: Black, Heterogeneous, Non-Fibrous, Bulk Material
Asbestos Types:
Other Material: Non-fibrous 8 %
Comment: Heat Sensitive (organic): 89.7%; Acid Soluble (inorganic): 2.3%; Inert (Non-asbestos): 8.0%

122018-3368-702-1	118121813-13	*No*	NAD (by NYS ELAP 198.6) by J. Samuel Baird on 12/28/18
702	**Location:** Flashing Tar; R-2		

Analyst Description: Black, Heterogeneous, Non-Fibrous, Bulk Material
Asbestos Types:
Other Material: Non-fibrous 12.9 %
Comment: Heat Sensitive (organic): 85.6%; Acid Soluble (inorganic): 1.4%; Inert (Non-asbestos): 12.9%

122018-3368-702-2	118121813-14	*No*	NAD (by NYS ELAP 198.6) by J. Samuel Baird on 12/28/18
702	**Location:** Flashing Tar; R-2		

Analyst Description: Black, Heterogeneous, Non-Fibrous, Bulk Material
Asbestos Types:
Other Material: Non-fibrous 10.2 %
Comment: Heat Sensitive (organic): 85.1%; Acid Soluble (inorganic): 4.7%; Inert (Non-asbestos): 10.2%

See Reporting notes on last page

PLM Bulk Asbestos Report

SET 3368; GHD/Matthew Skuse; Erie County Water Authority - Guenther Pump Station

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
122018-3368-703.5-1	118121813-15	*No*	NAD
703.5 **Location:** Tar Vapor Barrier; R-3			(by NYS ELAP 198.6) by J. Samuel Baird on 12/28/18
Analyst Description: Black, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 9.5 %			
Comment: Heat Sensitive (organic): 90.4%; Acid Soluble (inorganic): 0.1%; Inert (Non-asbestos): 9.5%			
122018-3368-703.5-2	118121813-16	*No*	NAD
703.5 **Location:** Tar Vapor Barrier; R-3			(by NYS ELAP 198.6) by J. Samuel Baird on 12/28/18
Analyst Description: Black, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 9.9 %			
Comment: Heat Sensitive (organic): 89.7%; Acid Soluble (inorganic): 0.4%; Inert (Non-asbestos): 9.9%			

Reporting Notes:

Analyzed by: J. Samuel Baird Date: 12/28/2018 Reviewed by:

*NAD = no asbestos detected, Detection Limit <1%, Reporting Limits: CVES = 1%, 400 Pt Ct = 0.25%, 1000 Pt Ct = 0.1%; "Present" or NVA = "No Visible Asbestos" are observations made during a qualitative analysis; NA = not analyzed; NA/PS = not analyzed / positive stop; PLM Bulk Asbestos Analysis by EPA 600/R-93/116 per 40 CFR 763 (NVLAP Lab Code 101904-0) and ELAP PLM Analysis Protocol 198.1 for New York friable samples which includes quantitation of any vermiculite observed (198.6 for NOB samples) or EPA 400 pt ct by EPA 600/M4-82-020 (NYSDOH ELAP Lab # 10984); CA ELAP Lab # 2508; Note: PLM is not consistently reliable in detecting asbestos in floor coverings and similar NOB materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos-containing in New York State (also see EPA Advisory for floor tile, FR 59, 146, 38970, 8/1/94). NIST Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the laboratory. This PLM report relates ONLY to the items tested.

118121813

SIENNA ENVIRONMENTAL TECHNOLOGIES

350 Elmwood Ave • Buffalo, NY 14222
P 716 332 3134 F 716 332 3136

Chain of Custody Document

Fax/Email Report to: Labresults@siennaet.com

Client/Contact: GHD
Matthew Skuse

Building/Location: Erie County Water Authority - Guenther Pump Station

Turn around (circle)
RUSH 48 Hour
24 Hour (72 Hour)

Job #: SET 3368 Total # Samples: 16

X PLM X TEM ____ AAS OTHER ____

Sample # Date	Job	HAN	ID#	Description of Sample	Location of Sample	Notes
122018	3368	607	1	Exterior Door - Caulk, Grey	Exterior West	
↓	↓	↓	2	↓	↓	
		608	1	Concrete Louver Guard Caulk, Beige	Exterior South	
		↓	2	↓	↓	
		609	1	Foundation Tar	Exterior South	
		↓	2	↓	↓	
		613	1	Concrete Ceiling, Seam Tar	002	
		613	2	↓	↓	
		614	1	Addition Roof Caulk, White	R-2	
		↓	2	↓	↓	
		7013	1	Tar Vapor Barrier	R-2	
		↓	2	↓	↓	
		702	1	Flashing Tar	R-2	
↓	↓	↓	2	↓	↓	
Page	1	of 2	—	—	—	

Notes:
Yes / No
☒ / ☐ yes Negative PLM to TEM per ELAP protocols
☒ / ☐ yes Positive stop by HAN
☒ / ☐ no Layered analysis is expected - Sample HAN-ID # ____

RECEIVED

Sampled By: Josh Duffy Date: DEC 27 2018

Relinquished By: Date:

By

Received By: Date:

118121813

SIENNA ENVIRONMENTAL TECHNOLOGIES

350 Elmwood Ave • Buffalo, NY 14222
P 716 332 3134 F 716 332 3136

Chain of Custody Document

Fax/Email Report to: Labresults@siennaet.com

Client/Contact: GHD
Matthew Skuse

Building/Location: Erie County Water Authority - Gunther Pump Station

Turn around (circle)
RUSH 48 Hour 24 Hour 72 Hour

Job #: SET 3368 Total # Samples: 16

X PLM X TEM ____ AAS OTHER ____

Sample # Date	Job	HAN	ID#	Description of Sample	Location of Sample	Notes
122018	3368	7035	1	Tar Vapor Barrier	R-3	
↓	↓	↓	2	↓	↓	
Page 2 of 2 -				—	—	

Notes:
Yes No
☒ ☐ Negative PLM to TEM per ELAP protocols
☒ ☐ Positive stop by HAN
☒ Layered analysis is expected - Sample HAN-ID # ____

RECEIVED

Sampled By: Josh Duffy Date: ____

Relinquished By: [signature] Date: DEC 27 2018

Received By: ____ Date: By

SIENNA
ENVIRONMENTAL TECHNOLOGIES

Appendix D

XRF Spectrum Analyzer Report and Instrument Information

LEAD PAINT INSPECTION REPORT

GHD
CLIENT

ECWA Guenther Pump Station
INSPECTION LOCATION

December 4 & 20, 2018
INSPECTION DATE(s)

Niton XLP
XRF INSTRUMENT TYPE

89839
XRF INSTRUMENT SERIAL NUMBER

1.0 mg/cm^2
ACTION LEVEL

12/20/2018

SIGNED: DATE:

Josh Duffy

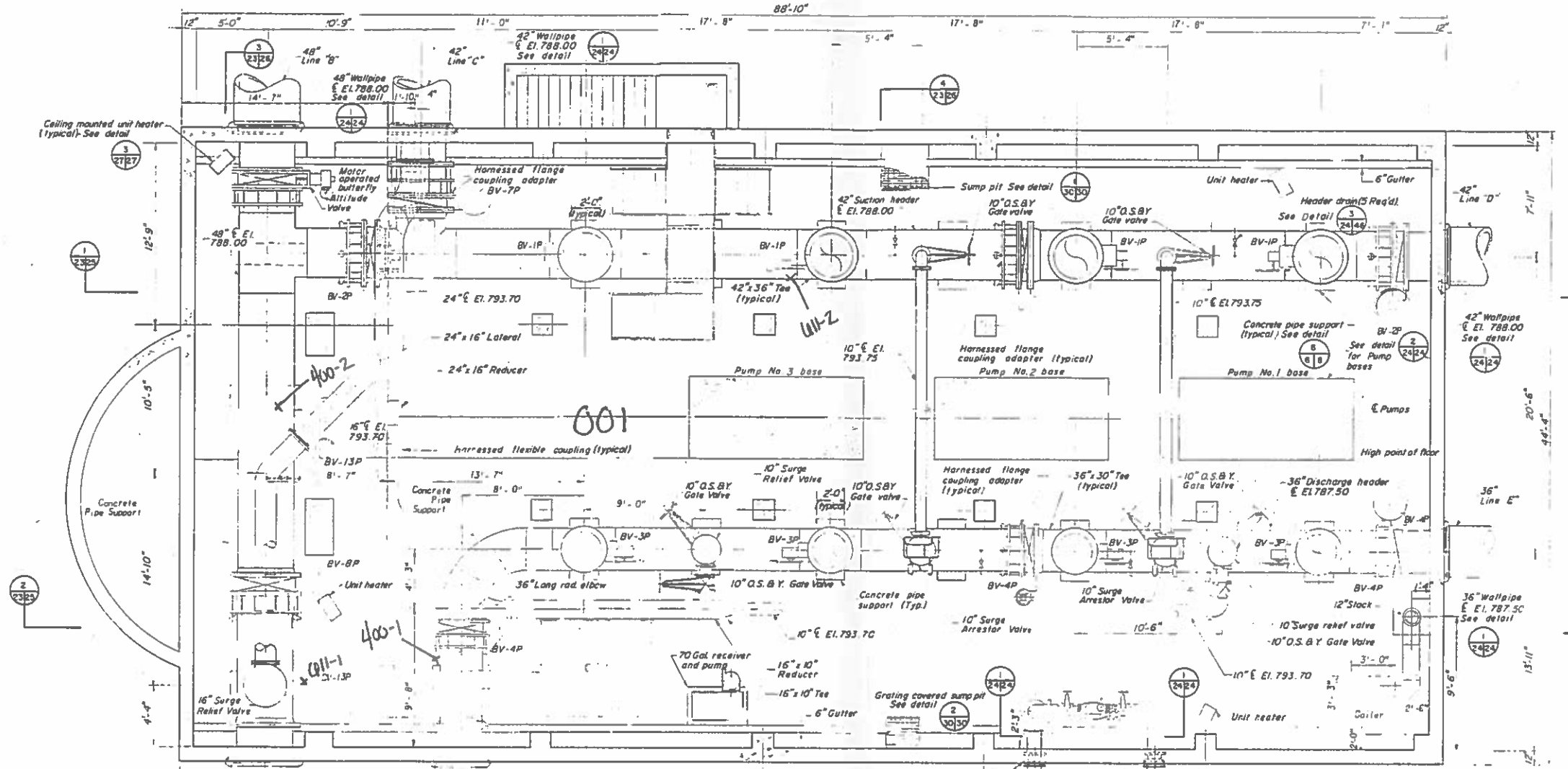
Index	Time	Room	Side	Color	Substrate	Component	Condition	PbC	PbC Error	Units
1	12/20/2018							3.11	0	cps
2	12/20/2018					CALIBRATE		1	0.1	mg / cm ^2
3	12/20/2018					CALIBRATE		1.1	0.1	mg / cm ^2
4	12/20/2018					CALIBRATE		1.1	0.1	mg / cm ^2
5	12/20/2018	2	A	BEIGE	CONCRETE	WALL	POOR	0.04	0.02	mg / cm ^2
6	12/20/2018	2	D	BEIGE	CONCRETE	WALL	POOR	< LOD	0.15	mg / cm ^2
7	12/20/2018	2	D	BEIGE	CONCRETE	CEILING	INTACT	< LOD	0.17	mg / cm ^2
8	12/20/2018	2	D	BLUE	METAL	RAILING	INTACT	0.5	0.2	mg / cm ^2
9	12/20/2018	2	D	BLUE	METAL	VALVE ASSEMBLY	INTACT	0.05	0.02	mg / cm ^2
10	12/20/2018	2	A	BLUE	METAL	CATWALK BEAM	INTACT	0.19	0.09	mg / cm ^2
11	12/20/2018	2	A	BLUE	METAL	CATWALK COLUMN	INTACT	0.8	0.2	mg / cm ^2
12	12/20/2018	2	A	BROWN	METAL	DOOR	INTACT	< LOD	0.03	mg / cm ^2
13	12/20/2018	2	A	TAN	METAL	DOOR FRAME	POOR	< LOD	0.16	mg / cm ^2
14	12/20/2018	2	B	BEIGE	METAL	ROOF PIPE	POOR	< LOD	0.45	mg / cm ^2
15	12/20/2018	2	B	BLUE	METAL	BLIND FLANGE	INTACT	< LOD	0.14	mg / cm ^2
16	12/20/2018	2	A	GREEN	CONCRETE	PIPE CRADLE	POOR	1	0.2	mg / cm ^2
17	12/20/2018	2	A	GREEN	CONCRETE	PIPE CRADLE	POOR	1.6	0.3	mg / cm ^2
18	12/20/2018	2	A	GREEN	METAL	CATWALK BEAM UNDERSIDE	POOR	0.6	0.2	mg / cm ^2
19	12/20/2018	100	A	YELLOW	GLAZED BLOCK	WALL	INTACT	1.2	0.1	mg / cm ^2
20	12/20/2018	100	A	BROWN	CONCRETE	FLOOR	INTACT	< LOD	0.03	mg / cm ^2
21	12/20/2018	100	D	BLUE	METAL	CENT. PUMP VALVE	INTACT	< LOD	0.14	mg / cm ^2
22	12/20/2018	100	D	BLUE	METAL	CENT. PUMP PIPE	INTACT	1.3	0.2	mg / cm ^2
23	12/20/2018	100	D	BLUE	METAL	CENT. PUMP	INTACT	< LOD	0.12	mg / cm ^2
24	12/20/2018	100	D	BLUE	METAL	CENT. PUMP BASEPLATE	POOR	0.4	0.2	mg / cm ^2
25	12/20/2018	100	D	BLUE	METAL	CENT. PUMP MOTOR	POOR	0.12	0.07	mg / cm ^2
26	12/20/2018	100	D	BLUE	METAL	CENT. PUMP MOTOR BASE	POOR	0.23	0.15	mg / cm ^2
27	12/20/2018	100	D	BLUE	METAL	CENT. PUMP CAPACITOR	POOR	< LOD	0.21	mg / cm ^2
28	12/20/2018	100	D	BEIGE	CONCRETE	CENT. PUMP CURB	POOR	1.1	0.1	mg / cm ^2
29	12/20/2018	100	A	TAN	METAL	WINDOW	INTACT	< LOD	0.03	mg / cm ^2
30	12/20/2018	100	A	TAN	METAL	OH DOOR	POOR	< LOD	0.12	mg / cm ^2
31	12/20/2018	100	A	TAN	METAL	OH DOOR FRAME	POOR	< LOD	0.09	mg / cm ^2
32	12/20/2018	100	A	GRAY	METAL	DOOR	INTACT	< LOD	0.03	mg / cm ^2
33	12/20/2018	100	A	GRAY	METAL	DOOR FRAME	INTACT	< LOD	0.03	mg / cm ^2
34	12/20/2018	100	A	GRAY	METAL	DOOR LINTEL	INTACT	< LOD	0.07	mg / cm ^2
35	12/20/2018	100	D	BEIGE	METAL	PIPE	POOR	< LOD	0.03	mg / cm ^2
36	12/20/2018	100	D	GRAY	METAL	TRANSFORMER	INTACT	< LOD	0.18	mg / cm ^2
37	12/20/2018	100	D	GRAY	METAL	MOTOR CONTROL CENTER	INTACT	< LOD	0.03	mg / cm ^2
38	12/20/2018	100	D	BEIGE	METAL	MOTOR CONTROL CENTER CURB	POOR	1.6	0.3	mg / cm ^2
39	12/20/2018	100	C	BEIGE	METAL	BOILER EXHAUST PIPE	POOR	< LOD	0.03	mg / cm ^2
40	12/20/2018	100	C	BROWN	METAL	DOOR	INTACT	< LOD	0.03	mg / cm ^2
41	12/20/2018	100	C	TAN	METAL	DOOR FRAME	INTACT	< LOD	0.03	mg / cm ^2
42	12/20/2018	100	C	TAN	METAL	DOOR LINTEL	INTACT	< LOD	0.08	mg / cm ^2
43	12/20/2018	100	B	YELLOW	METAL	CRANE HOIST	INTACT	2.2	0.5	mg / cm ^2
44	12/20/2018	100	B	YELLOW	METAL	CRANE HOIST TRACK	POOR	< LOD	0.17	mg / cm ^2
45	12/20/2018	100	B	BEIGE	METAL	BEAM	INTACT	0.3	0.19	mg / cm ^2
46	12/20/2018	100	B	BEIGE	CONCRETE	CEILING	INTACT	0.23	0.07	mg / cm ^2
47	12/20/2018	1	D	BEIGE	CONCRETE	WALL	INTACT	0.14	0.09	mg / cm ^2
48	12/20/2018	1	B	BEIGE	CONCRETE	COLUMN	INTACT	0.23	0.07	mg / cm ^2
49	12/20/2018	1	B	GREEN	CONCRETE	COLUMN	POOR	1.1	0.1	mg / cm ^2
50	12/20/2018	1	CENTER	GREEN	CONCRETE	WALL	POOR	< LOD	0.03	mg / cm ^2
51	12/20/2018	1	A	GREEN	CONCRETE	PIPE CRADLE	POOR	1.7	0.4	mg / cm ^2
52	12/20/2018	1	A	LT GREEN	METAL	WHEEL VALVE ASSEMBLY	POOR	< LOD	0.09	mg / cm ^2
53	12/20/2018	1	D	GREEN	METAL	CATWALK BEAM	INTACT	0.5	0.2	mg / cm ^2
54	12/20/2018	1	D	GREEN	METAL	CATWALK COLUMN	INTACT	0.8	0.1	mg / cm ^2
55	12/20/2018	1	D	GREEN	METAL	STRINGER	INTACT	0.7	0.1	mg / cm ^2
56	12/20/2018	1	C	BLUE	METAL	CIRC PIPE	INTACT	< LOD	0.03	mg / cm ^2
57	12/20/2018	1	C	BLUE	METAL	CIRC VALVE	INTACT	< LOD	0.03	mg / cm ^2
58	12/20/2018	1	C	BLUE	METAL	CIRC PUMP	POOR	< LOD	0.03	mg / cm ^2
59	12/20/2018	1	C	BLUE	METAL	CIRC PUMP MOTOR	POOR	< LOD	0.03	mg / cm ^2
60	12/20/2018	1	C	BLUE	METAL	CIRC PUMP BASEPLATE	POOR	< LOD	0.03	mg / cm ^2
61	12/20/2018	1	B	BROWN	METAL	DOOR	INTACT	< LOD	0.04	mg / cm ^2
62	12/20/2018	1	B	TAN	METAL	DOOR FRAME	POOR	< LOD	0.04	mg / cm ^2
63	12/20/2018	1	B	GREEN	METAL	STRINGER	INTACT	0.6	0.2	mg / cm ^2
64	12/20/2018	1	B	BEIGE	METAL	CONDUIT	INTACT	< LOD	0.24	mg / cm ^2
65	12/20/2018	1	D	BEIGE	METAL	PIPE	INTACT	< LOD	0.09	mg / cm ^2
66	12/20/2018	1	D	BEIGE	CONCRETE	CEILING	INTACT	0.1	0.07	mg / cm ^2
67	12/20/2018	101	C	GRAY	CERAMIC	FLOOR	INTACT	< LOD	0.03	mg / cm ^2
68	12/20/2018	101	D	WHITE	CERAMIC	SINK	INTACT	< LOD	0.04	mg / cm ^2

69	12/20/2018	101	D	WHITE	CERAMIC	TOILET	INTACT	< LOD	0.05	mg / cm ^2
70	12/20/2018	101	C	TAN	METAL	DOOR	POOR	< LOD	0.03	mg / cm ^2
71	12/20/2018	101	C	TAN	METAL	DOOR FRAME	POOR	< LOD	0.03	mg / cm ^2
72	12/20/2018	100	B	BLUE	METAL	CENT PUMP PIPE	INTACT	< LOD	0.13	mg / cm ^2
73	12/20/2018	102	A	YELLOW	GLAZED BLOCK	WALL	INTACT	0.9	0.1	mg / cm ^2
74	12/20/2018	102	A	YELLOW	GLAZED BLOCK	WALL	INTACT	0.9	0.1	mg / cm ^2
75	12/20/2018	102	A	BEIGE	CONCRETE	CEILING	POOR	< LOD	0.03	mg / cm ^2
76	12/20/2018	102	C	BROWN	CONCRETE	FLOOR	INTACT	< LOD	0.03	mg / cm ^2
77	12/20/2018	102	C	PETINA	CONCRETE	FLOOR DRAIN	INTACT	21.9	11.4	mg / cm ^2
78	12/20/2018	102	A	BROWN	METAL	DOOR	POOR	< LOD	0.03	mg / cm ^2
79	12/20/2018	102	A	BROWN	METAL	DOOR FRAME	POOR	< LOD	0.03	mg / cm ^2
80	12/20/2018	103	B	ORANGE	GLAZED BLOCK	WALL	INTACT	2.7	0.6	mg / cm ^2
81	12/20/2018	103	B	GRAY	METAL	RADIATOR	INTACT	< LOD	0.09	mg / cm ^2
82	12/20/2018	103	C	GREEN	METAL	SCALE	POOR	1.1	0.1	mg / cm ^2
83	12/20/2018	103	C	GRAY	METAL	SCALE	POOR	< LOD	0.04	mg / cm ^2
84	12/20/2018	104	D	BLUE	GLAZED BLOCK	WALL	INTACT	2.4	0.8	mg / cm ^2
85	12/20/2018	104	C	RUST	METAL	FLOOR DRAIN	POOR	< LOD	0.03	mg / cm ^2
86	12/20/2018	104	B	TAN	METAL	DOOR	INTACT	< LOD	0.03	mg / cm ^2
87	12/20/2018	104	B	TAN	METAL	DOOR FRAME	INTACT	< LOD	0.06	mg / cm ^2
88	12/20/2018	EXTERIOR-WEST	A	GREEN	BRICK	WALL	INTACT	< LOD	0.03	mg / cm ^2
89	12/20/2018	EXTERIOR-WEST	A	BROWN	METAL	DOOR	INTACT	< LOD	0.03	mg / cm ^2
90	12/20/2018	EXTERIOR-WEST	A	BROWN	METAL	DOOR FRAME	POOR	< LOD	0.03	mg / cm ^2
91	12/20/2018	EXTERIOR-WEST	A	GREEN	METAL	OH DOOR	POOR	< LOD	0.11	mg / cm ^2
92	12/20/2018	EXTERIOR-WEST	A	GREEN	METAL	OH DOOR FRAME	POOR	< LOD	0.38	mg / cm ^2
93	12/20/2018	EXTERIOR-WEST	A	GREEN	METAL	CORNER GUARD	POOR	< LOD	0.29	mg / cm ^2
94	12/20/2018	EXTERIOR-SOUTH	D	GRAY	METAL	LOUVER LINTEL	POOR	< LOD	0.03	mg / cm ^2
95	12/20/2018	EXTERIOR-SOUTH	D	RED	METAL	LOUVER FRAME	POOR	< LOD	0.11	mg / cm ^2
96	12/20/2018					CALIBRATE		1.1	0.1	mg / cm ^2
97	12/20/2018					CALIBRATE		1.2	0.6	mg / cm ^2
98	12/20/2018					CALIBRATE		1.1	0.1	mg / cm ^2
99	12/20/2018					CALIBRATE		1.1	0.1	mg / cm ^2

SIENNA
ENVIRONMENTAL TECHNOLOGIES

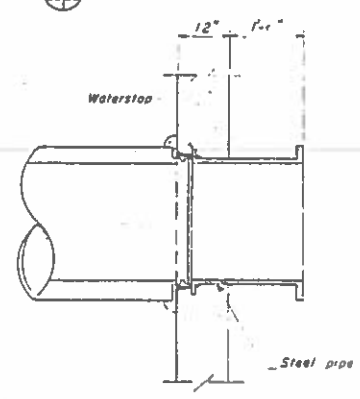
Appendix E

Sample Floor Plans



BASEMENT PLAN

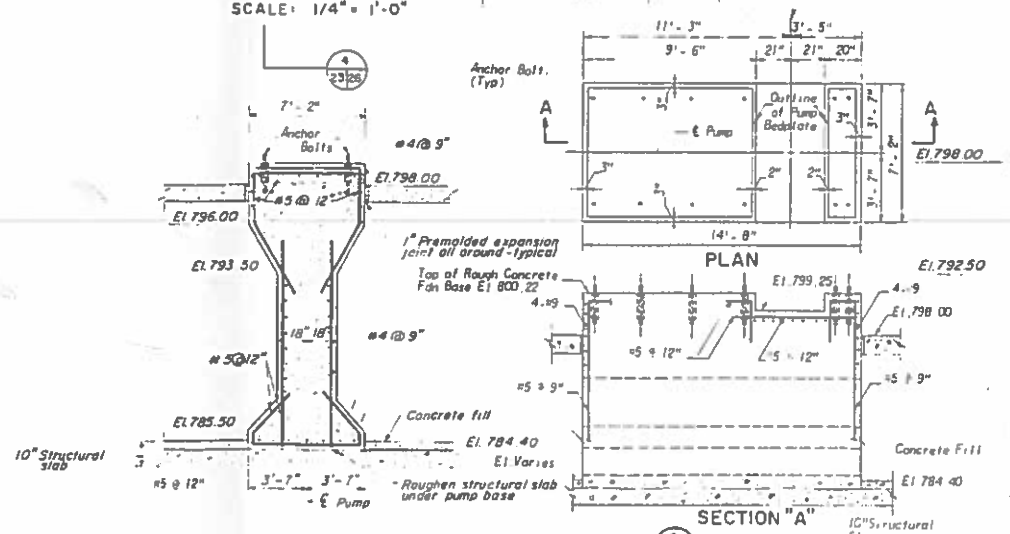
SCALE: 1/4" = 1'-0"



DETAIL (1/24|24)

WALL PIPE

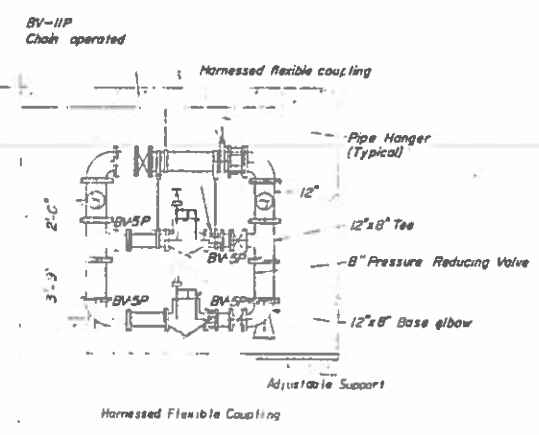
NOT TO SCALE



DETAIL (2/24|24)

PUMP BASE (3 REQUIRED)

NOT TO SCALE



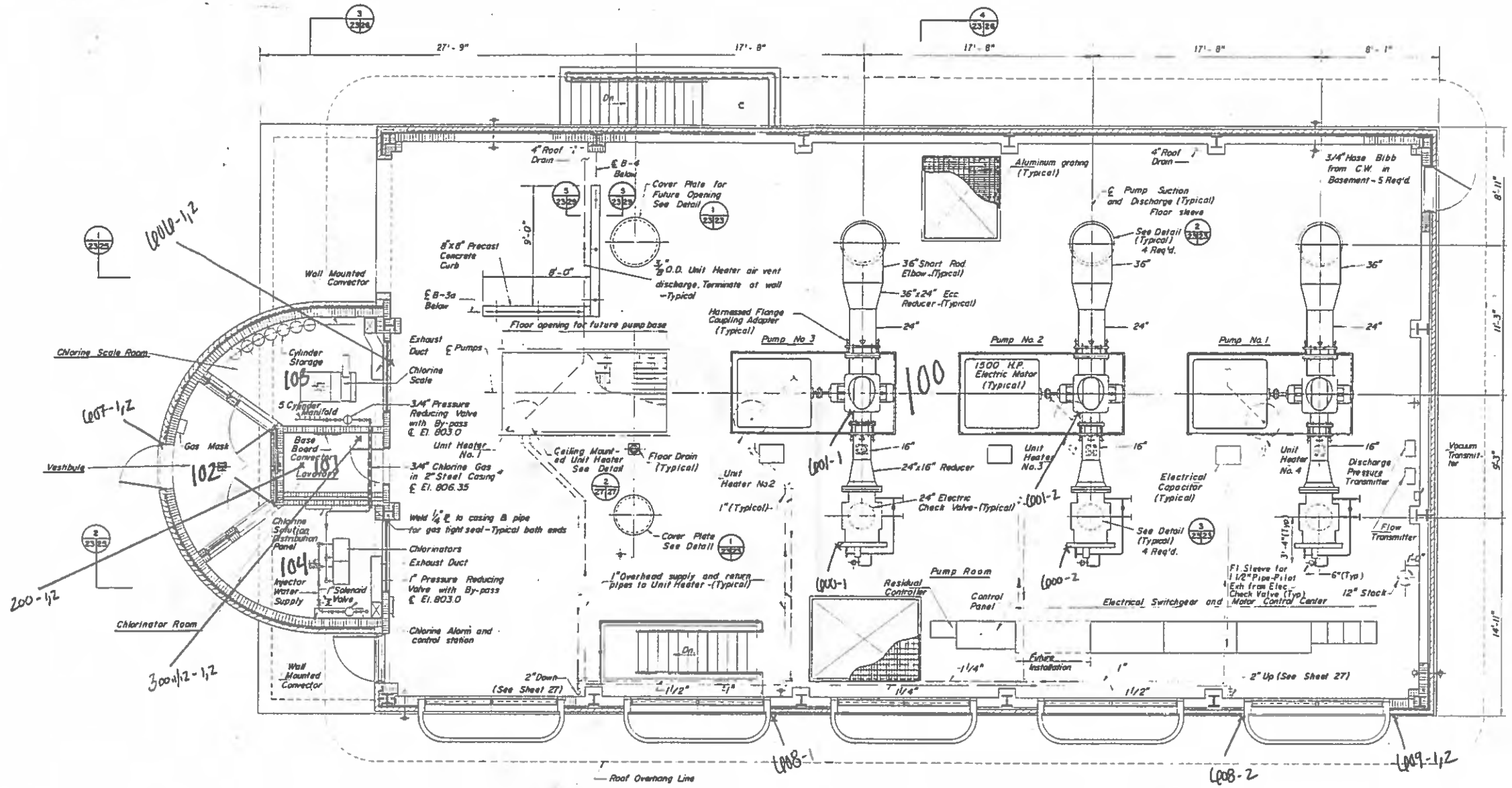
SECTION (1/24|24)

SCALE: 1/4" = 1'-0"

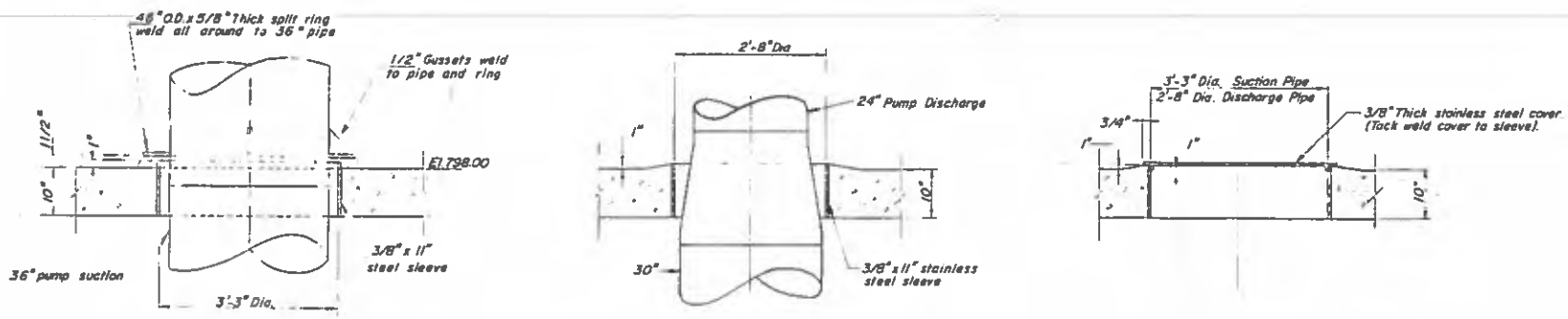
11/4/72 R.O.M

MALCOLM PIRNIE ENGINEERS		DESIGNED RLC DRAWN WS CHECKED HAW JK REVISIONS: JUNE 1972	ERIE COUNTY WATER AUTHORITY BUFFALO, NEW YORK PLEASANT PUMPING STATION AND TANK MODIFICATIONS AT WINDOM PUMPING STATION	PLEASANT PUMPING STATION MECHANICAL BASEMENT PLAN & DETAILS SCALES AS INDICATED	DATE JANUARY 1969 SHEET 24 OF 47 DWG. NO. 041-69-024-1

CONT-005-6900-PD



OPERATING FLOOR PLAN
SCALE 1/4"=1'-0"



DETAIL (2/23/23)
PUMP SUCTION FLOOR SLEEVE
SCALE: 3/4"=1'-0"

DETAIL (3/23/23)
PUMP DISCHARGE FLOOR SLEEVE
SCALE: 3/4"=1'-0"

DETAIL (1/23/23)
COVER FOR FUTURE OPENINGS
NO SCALE

8/14/72 RJM

MALCOLM PIRNIE ENGINEERS

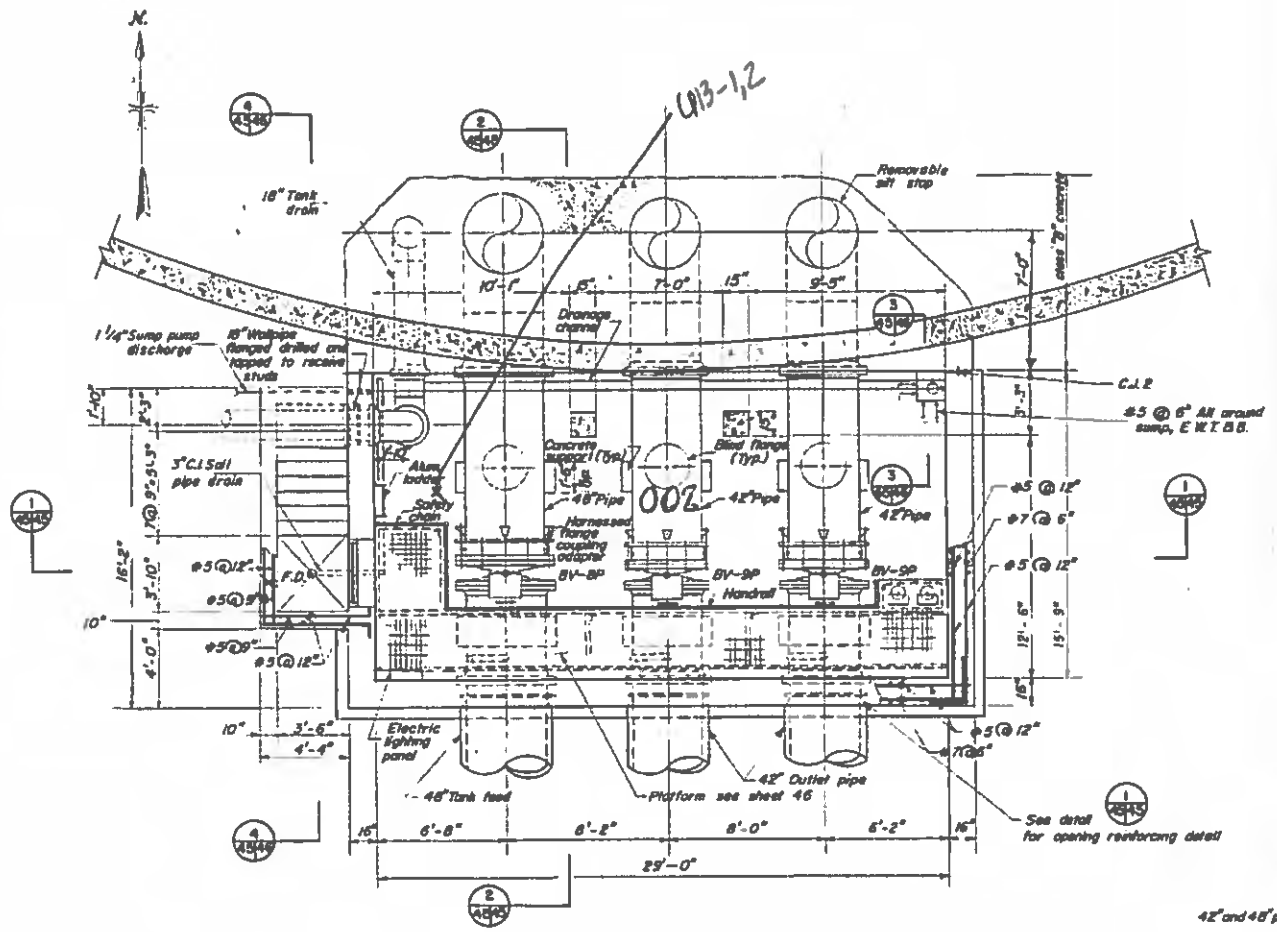
DESIGNED EBC DRAWN RJM CHECKED WWH
REVISIONS: JUNE, 1972

ERIE COUNTY WATER AUTHORITY
BUFFALO, NEW YORK
PLEASANT PUMPING STATION AND TANK
MODIFICATIONS AT WINDOM PUMPING STATION

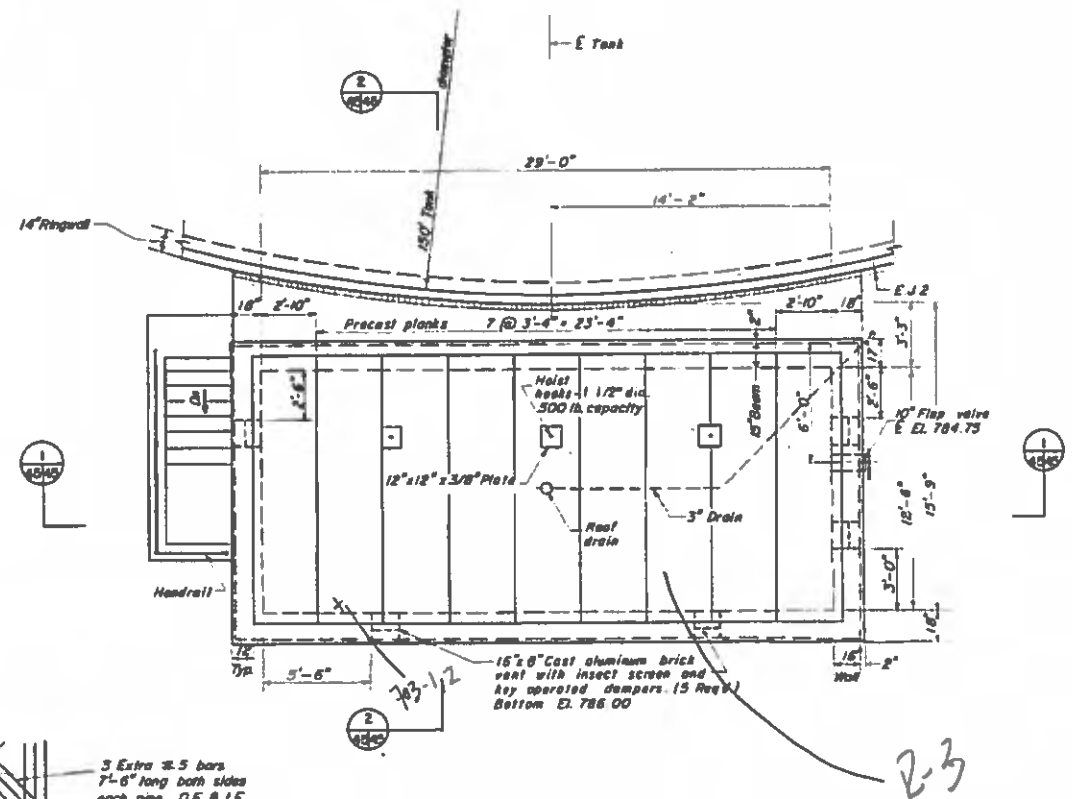
PLEASANT PUMPING STATION
MECHANICAL OPERATING FLOOR PLAN & DETAILS
SCALES AS INDICATED

DATE JANUARY 1969
SHEET 23 OF 47
DWG. NO. 041-69 023-1

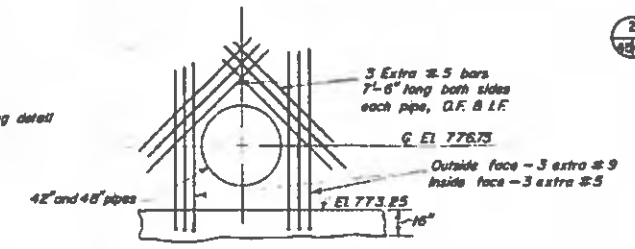
CONT - 005 - 6900 - PD



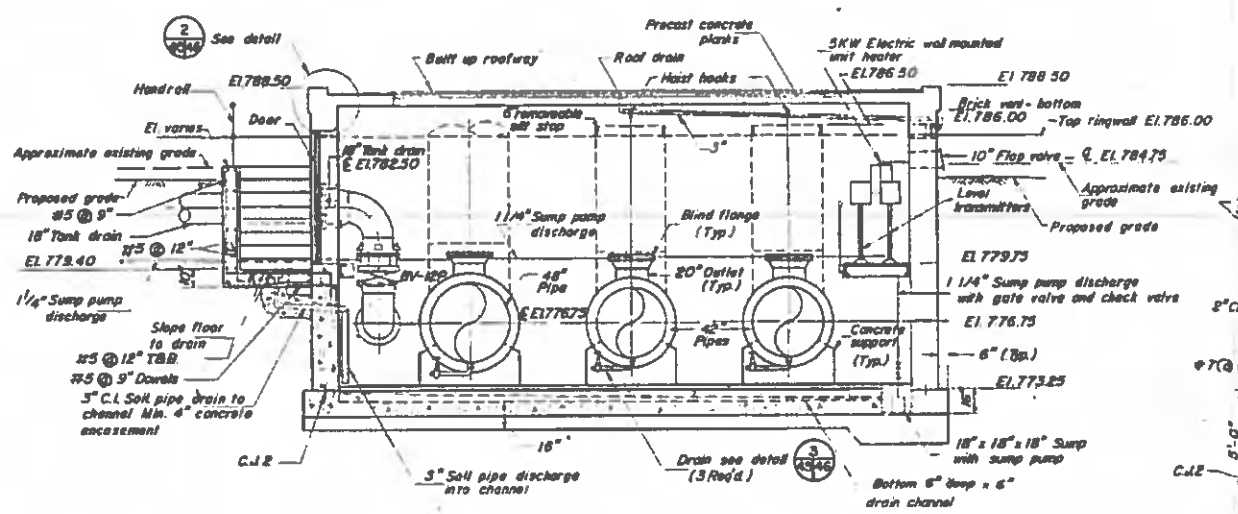
SECTIONAL PLAN AT ELEVATION 783.00



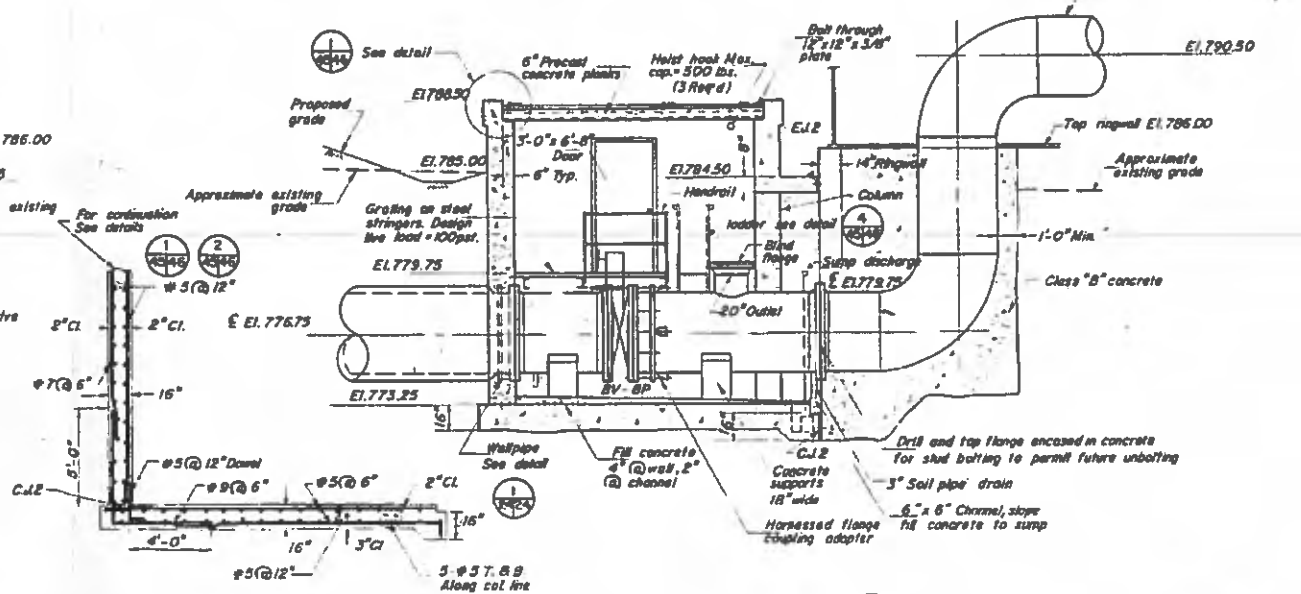
ROOF PLAN



DETAIL
Opening Reinforcing Details



SECTION



SECTION THROUGH VALVE CHAMBER AT RINGWALL STATION 0+00 LOOKING WEST

SECTION

4/4/72 RDM

MALCOLM PIRNIE ENGINEERS

DESIGNED ... DRAWN ... CHECKED ...
REVISIONS: JUNE 1972

ERIE COUNTY WATER AUTHORITY
BUFFALO, NEW YORK
PLEASANT PUMPING STATION AND TANK
MODIFICATIONS AT WINDOM PUMPING STATION

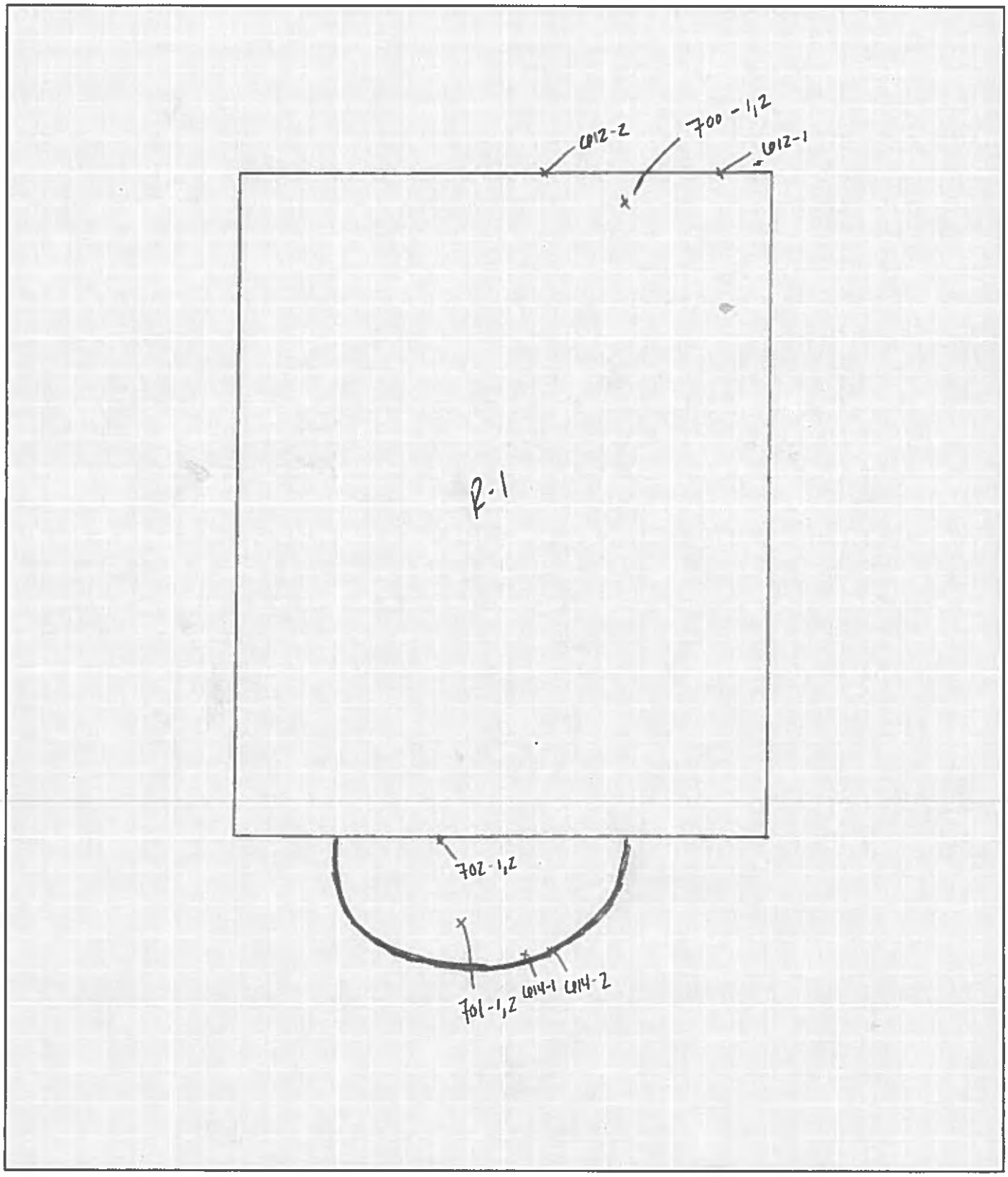
PLEASANT TANK
VALVE CHAMBER PLANS AND SECTIONS
SCALE: 1/4" = 1'-0"

DATE JANUARY 1969
SHEET 45 OF 47
DWG. NO 041-68.045-1

CONT-005-6900-PD

SIENNA
ENVIRONMENTAL TECHNOLOGIES
350 Elmwood Avenue Buffalo, New York 14222
ph: 716.332.3134 www.siennaet.com

SET #: 3368 Date: 12/20/18
Project: ECWA GUENTHER PUMP STATION
Room: ROOFS
Scale: NTS
Visit: ☒ Inspection ☐ Design ☐ Coordination ☐ PM



SIENNA
ENVIRONMENTAL TECHNOLOGIES

Appendix F

Summary of Inspected Functional Spaces

- 001 – Basement Level
- 002 – Valve Chamber
- 100 – Mech. Operating Floor
- 101 – Bathroom
- 102 – Storage/ Old Vestibule
- 103 – Storage/ Chlorine Scale Room
- 104 – Storage/ Old Chlorinator Room
- 200 – Exterior Elevations
- 300 – R1 Main Roof
- 301 – R2 Lower Roof
- 302 – R3 Valve Chamber Roof

Appendix G

Site Photographs

Photo #1: HAN 400 Tar Coating on Foam Pipe Insulation (ACM)

Photo #2: HAN 611 Hand Wheel Actuator Gasket (ACM)

Photo #3: HAN 602 Pump Motor Control – Electrical Components (Assumed ACM)

Photo #4: HAN 604 Pump Wiring (Assumed ACM)

Photo #5: HAN 605 Wax Paper Whip Wire Insulation (Assumed ACM)

Appendix E
Geotechnical Report

BARRON & ASSOCIATES, P.C.
Geotechnical Consulting and Special Inspections
10440 Main Street (716) 759-7821
Clarence, NY 14031 www.barronandassociatespc.com

June 2, 2020 Job No: 20-537

GHD Consulting Services, Inc.
285 Delaware Avenue, Suite 500
Buffalo, New York 14202

ATTN: Mr. Jacob Kocic

RE: Geotechnical Engineering Report
Proposed Guenther Pump Station Expansion
3478 Pleasant Avenue
Town of Hamburg, Erie Co., New York 14075

Gentlemen:

This report presents the findings of the subsurface investigation program and geotechnical engineering recommendations for the above referenced project. The geographic orientation of the project site is illustrated on the U.S. Geologic Survey (USGS) site location map in Figure No. 1. The project site is illustrated in Figure No. 2, entitled "Test Boring Location Plan", which includes: the approximate location of three test borings that were drilled by Buffalo Drilling Company, Inc. (BDC); relative ground surface elevations; and additional site details.

EXPLORATION METHODS

Sampling Method: A truck-mounted Diedrich D-50 rotary drill rig was used to drill three borings each to depths ranging from approximately 10 to 21 feet below ground surface by using 2-1/4 inch and 4-1/4 inch inside diameter (ID), continuous flight hollow stem augers. Samples were recovered by driving a standard split-spoon sampler (2-foot long by 1-3/8 inch inside diameter) 24 inches with a 140-pound hammer falling 30 inches per blow per the American Society of Testing and Materials (ASTM) Standard D1586. The number of blows from six to 18 inches of penetration is defined as the Standard Penetration Test (SPT) N-value. Auger refusal, which may infer the top of bedrock, was encountered at each boring location at depths ranging from about 10 to 11 feet. At boring B-2, bedrock was confirmed by coring to a depth of 10 feet below auger refusal. Bedrock coring efforts were done with an Nx-sized (2-1/8 ± inch I.D.) core barrel and impregnated diamond bit in accordance with ASTM Method D2113.

Any encountered groundwater conditions are documented in the field on the driller's logs for each test boring. If indicators of groundwater are observed on the sampling equipment, the depth to groundwater is also checked and measured through the hollow stem augers at the completion of the sampling efforts.

Classification: The retrieved soil and fill samples were initially logged in the field by the driller, and a portion of each sample was placed and sealed in a glass jar. The boring logs, which are included in Appendix A, were based upon the field logs and a second visual classification of recovered samples in the laboratory by a geologist. Classification/identification of samples, as noted on the boring logs, is based on the Unified Soil Classification System (USCS) in ASTM D2487/D2488. Refer to Appendix B entitled, "Geotechnical Reference Standards", for an explanation of the terminology that is used for soil and rock descriptions.

Each rock core was examined on a run-by-run basis to determine the percentage of core recovery and Rock Quality Designation (RQD). Core recovery percentage is the ratio of the sample length recovered divided by the length of the core run times 100 percent. RQD is defined as the total length of all pieces of core that are greater than four inches divided by the length of the core run times 100 percent. Core recovery and RQD percentages are noted on the boring logs.

Laboratory Testing: Laboratory soil testing was undertaken on several retrieved split spoon samples. The overall laboratory testing program consisted of the following test methods:

- Water (Moisture) Content of Soil — ASTM D2216
- Unconfined Compressive Strength of Intact Rock Core Specimens — ASTM D2938
- Liquid Limit, Plastic Limit, and Plasticity Index of Soils — ASTM D4318

Table No. 1 presents the tabulated results of the physical/soil index properties. The associated graphical illustration of the data is included in Appendix C. The bedrock physical property data on the test specimens are presented in Table No. 2.

SITE AND SUBSURFACE CONDITIONS

General: The proposed site for development is within the Erie County Water Authority Guenther Pump Station Facility addressed as 3478 Pleasant Avenue in the Town of Hamburg, Erie County, New York. The project will include a single-story building addition along the west side of the existing pump station building. The site topography is generally flat across the boring locations with ground surface elevations varying by less than one foot and a slight slope to the northwest.

Subsurface Soil Conditions: In general, subsurface conditions, underlying a 12-inch-thick layer of asphalt pavement at borings B-1 and B-3 or six inches of topsoil at boring B-2, consist of naturally deposited cohesive/fine-grained glacial till which mantles a zone of weathered shale that extends to auger refusal.

Beneath the asphalt or topsoil, a naturally deposited cohesive/fine-grained glacial till exists and extends eight to nine feet below existing grade. The till generally consists of slightly plastic, clay and silt with lesser amounts of sub-rounded fine-sized to coarse-sized sand and gravel. The consistency of this soil is

primarily very stiff to hard with moisture contents of retrieved samples noted to be moist. The proposed footing bearing grades for the addition will be within this soil and step to a deeper elevation to match the existing building foundation.

A thin zone of weathered shale bedrock exists beneath the glacial till and above auger refusal. This two-foot-thick layer consists of very dense, sand to gravel-sized fragments of weathered shale bedrock which are intermixed with decomposing shale that has been reduced to silt and clay sized particles. Moisture contents of retrieved samples are noted to be in a moist state.

Bedrock: Auger refusal, which is generally inferred to be the top of the apparent bedrock surface, was not encountered at each boring approximately 10 to 11 feet below ground surface, elevations 788.66 to 786.00+/- feet.

Rock coring efforts were undertaken at borings B-2 to depths of 10 feet, below auger refusal. Based upon the regional geology and recovered core samples, the bedrock type is the Rhinestreet Shale Member of the West Falls Formation and is described as a moderately hard and slightly weathered, medium light gray, banded to thinly bedded, very finely crystalline shale that is porous and argillaceous. The percent recoveries for the cores ranged from 73 percent to 99 percent with RQD values of 0 percent (very poor quality).

Table No. 2 provides the laboratory uniaxial compressive strength and density data for the intact shale specimens near the bottom part of the cored interval C-3. The density data is characteristic of a shale rock. The uniaxial compressive strength is approximately 5,000 pounds per square inch (psi); which is on the lower middle portion of the range for shale. The intact bedrock uniaxial compressive strength and other rock properties (e.g., RQD) can be used in the estimation of the strength properties for the bedrock mass.

Groundwater: Groundwater was not encountered during subsurface exploration. Note that the groundwater readings were taken at the completion of drilling efforts and, therefore, an adequate amount of time for the groundwater level to recharge to static conditions was probably not allowed. Fluctuations in the groundwater level may occur due to other factors than those present during field operations.

EARTHQUAKE/SEISMIC CONSIDERATIONS

Site Class Definition: For the given site conditions, the most applicable site definition is Site Class C, as listed in Table 1613.5.2 of the Building Code of New York State, © 2010.

Liquefaction Potential: For the Site Class C, the design spectral response acceleration parameters S_{DS}, at 0.2 seconds, and S_{D1}, at one second, are 0.16g and 0.06g (g = 32.2 feet/sec^2), respectively, for this part of Erie County, New York (see Appendix D). These values have a two percent probability of being

exceeded in 50 years. Based upon the above conditions and an approximate magnitude 6.0 earthquake on the Richter Scale, the potential for liquefaction or settlement of Site Class C soil/rock is considered extremely low to non-existent.

FOUNDATION DESIGN AND CONSTRUCTION RECOMMENDATIONS

General: This section will present and discuss recommendations on foundation design and construction and placement of controlled fills, and subgrade and base layer requirements for concrete floor slabs, paved parking and roadway areas.

As shown in Figure No. 2, the proposed development will include a single-story addition along the west side of the existing pump station building. The existing ground surface generally flat across the proposed development areas with ground surface elevations varying by less than one foot. As per conversations via email with client representatives, finish floor elevation for the addition is proposed to closely match that of the existing pump station building at elevation 798.00 ± feet. The final exterior grades are proposed to also closely match existing, at elevation 797.00 ± feet. The maximum design exterior bearing wall and column loads are not expected to exceed six kips per lineal foot and 80 kips, respectively. The maximum design interior bearing column load is not expected to exceed 120 kips.

Site Preparation and Earthwork: General site preparation will include the demolition and complete removal of any encountered foundations and floor slabs, and removing all unsuitable surficial material (i.e., asphalt pavement, concrete, brick, expansive slag, organic or topsoil layer, and construction and demolition-like fill) to a depth where firm, granular or cohesive fills or naturally occurring soils are encountered. It is recommended, particularly in the location of the proposed structure, that any slag and/or cinder/ash containing material, if encountered, should be tested to determine the expansion and corrosion characteristics (where applicable for direct or potential contact with foundation elements and buried utilities) of these materials prior to their use on-site. Any rubble-like and brick fill, boulders, or wood fill in particular, if encountered, will require undercutting. The proposed addition and any paved areas are to be proof rolled with a fully loaded ten-wheel dump truck. All encountered soft and disturbed zones should be undercut and stabilized with granular fill that is placed in compacted lifts prior to placement of additional fill materials above. Refer to Appendix E entitled "General Earthwork Specification" for definition of the fill types and gradations, recommended minimum compaction requirements for various site developments, and placement and compaction methods. The NYS Department of Transportation (NYSDOT) specification numbers for typical aggregate subbase/base course components that are included in the select granular fill category as are as follows: Item No. 304.12 (Metric) Subbase Course, Type 2 (< 2-inch maximum size), which is preferred; or Item No. 304.14 (Metric) Subbase Course, Type 4 (< 2-inch maximum size).

Other than the existing chemical room that will be demolished, it is unknown if any former residential/commercial structures, existed at the project site and if any former footings and foundation walls may be buried within the addition footprint. Septic tank and system locations and the abandonment conditions or practices are normally unknown. If encountered during site development, it is recommended that any tanks and systems should be properly removed/treated/remediated relative to the proposed development and under the applicable local and state regulations. The remaining cavities, from the aforementioned items, should be backfilled with select/approved granular fill that is placed in thin lifts and compacted to the minimum recommendation, as presented in this report, for the proposed development at that cavity location.

Shallow Foundation: The recommended foundation type is shallow footings. Continuous strip and spread exterior footings and interior spread footings would bear at an elevation of four feet or lower below final grade, at elevation 793.00 ± feet and step to match bearing elevations of the existing building foundation at 783.23 ± feet . A four-foot minimum footing depth (as required by local or New York State code) is needed to provide adequate protection from frost for exterior footings.

The exterior and interior footings are recommended to bear at the same relative elevation on stable, naturally deposited very stiff (Nvalues > 15 blows) or better cohesive/fine-grained glacial till or on thin layers of thoroughly compacted (minimum of 95 percent of the maximum dry density by ASTM D 1557) select/approved granular fill that is placed on an approved subgrade. If needed, a geotextile strength and filter fabric (such as, Mirafi 600X) may be used to line the excavation bottom for the purpose of stabilizing the excavation and placement of the select/approved granular fill. Alternatively, in heated buildings the interior footings are recommended to bear two and one-half feet or lower below finish floor and on the same soil/fill conditions as the exterior footings.

Undercut areas beneath proposed foundations must extend laterally beyond each vertically projected edge of the foundation by a minimum distance equal to one-half the total depth of the undercut or equating to a slope of two vertical to one horizontal from the bottom foundation corner. The undercuts and placement of compacted select/approved granular fill are required to ensure a suitable and more uniform bearing media for the footings, and to prevent unacceptable differential settlements.

Wall footings should have a minimum two-foot width and column footings should have a minimum three-foot width. Based on the above described conditions, the recommended maximum net allowable foundation bearing pressure is 3,500 pounds per square foot (psf) of bearing area. All footings for the proposed addition are recommended to be designed near the same contact pressure. The recommended maximum net allowable foundation bearing pressure is based on generally accepted design methods for cohesive soil conditions. Based on the provisions of the above recommendations and estimated design

requirements and utilization of proper construction procedures and experienced field supervision and testing personnel, total and differential settlements are estimated to be less than one inch and 3/4's inch, respectively. Refer to Appendix D for additional foundation design and construction details.

Additional Foundation Considerations: In addition to the above, the following recommendations will provide additional assurances with regard to proper foundation construction.

a) All fill placed beneath, adjacent, or above foundations must comply with the "General Earthwork Specification", included as Appendix E.

b) Backfill of foundations with approved select granular fill must be completed prior to placement of substantial superstructure loads, except for basement walls or substructure areas that may additionally require superstructure loads and possibly internal bracing.

c) The upper silty materials may rut and “pump” if exposed to excessive surface water and repeated construction traffic. Proper site management and fill placement operations are needed to minimize costly undercuts and subgrade repairs prior to placement of concrete slabs and asphalt pavement. It is noted that construction during wet/rainy and/or Fall and Spring conditions may require added precautions and possibly a thicker base layer to maintain a stable subgrade condition.

d) Step footings, if utilized, should have a rise to run ratio of 1:2, with a two-foot maximum rise and a four-foot minimum run between steps or as recommended by the design structural engineer.

e) The recommended at rest (rigid wall), active, and passive static earth pressure coefficients for unsaturated, select granular sandy gravel fill against an earth retaining structure/wall are 0.76, 0.24, and 2.8 (with an ultimate value of 4.2), respectively. The respective equivalent static lateral fluid pressures are recommended to be 90, 30 and 330 (with an ultimate value of 500) pounds per square foot (psf) per foot depth which are based upon a moist, compacted unit backfill weight of 120 pounds per cubic foot (pcf). The at rest value would account for the average expected compaction induced stresses and/or the potential influences of hydrostatic pressure. The static lateral fluid pressures can be directly proportioned for other unit weights.

Stabilization of Excavations: The trench/excavation sidewall stability concerns can be addressed with the Occupational Safety and Health Act (OSHA) requirements as set forth in Subpart P of 29 CFR Part 1926, Sections 1926.650 to 1926.652. In lieu of a properly designed shoring system, side slopes of the trench excavation should be one on one (vertical to horizontal distance) or flatter in cohesive soils or one on one and one-half or flatter in the granular materials, as required by OSHA.

Water must not be allowed to accumulate or pond on exposed foundation bearing grades. Surface water and groundwater from within the excavation must be either pumped, diverted or channelized by gravity flow to effectuate the construction of the proposed foundation. Pockets of localized perched groundwater may seasonally be expected to be encountered at footing and/or footing undercut bearing grades. At these locations, dewatering with surface sumps may be required to maintain stable side slopes and excavation bottom.

Concrete Interior Floor Slab(s)/Pad: For the most part and based on test results for similar soils/fills, slightly plastic cohesive natural soils/fills may be somewhat difficult to compact in a controlled manner considering the varying soil plasticity and natural moisture contents that are estimated to be at to wet of optimum, at the time of this investigation. Excavated and approvable cohesive soil/fill types are not expected to be available in any reasonable quantities. These soils/fills may be expected to be suitable for re-use as general fill with the implementation of uniformly applied soil conditioning (i.e., drying and blending) and compaction methods, if additional volume of soil for backfill is needed.

Excavated and approvable granular (i.e., sand or gravel and non-plastic silt and sand) soil/fill are not expected to be available. For the most part, granular (i.e., sand or gravel) soil/fill is expected to be acceptable for on-site re-use, as general/ordinary fill without substantial reworking and/or modification, while silty fine-sized sand may first require drying and blending.

Dissimilar excavated materials should not be commingled prior to their use elsewhere on-site, unless designated for a green/vegetation area. General fill material is also recommended to be placed on prepared and approved subgrade and in accordance with previous recommendations.

A geotextile fabric (such as, Mirafi 600X or equal) that separates the subgrade and the approved/select granular base layer may be needed and is particularly recommended for sensitive cohesive/fine-grained/silty clay subgrade soil/fills. This approach will stabilize and provide a workable building pad condition with minimal required repairs.

The approved subgrades will most likely consist of very stiff or better/thoroughly compacted (i.e., minimum 92 percent of the maximum dry density by ASTM D 1557) cohesive/fine-grained glacial till and/or a thoroughly compacted imported select/approved granular fill. Above the approved subgrades, a minimum 12-inch thick select granular fill (i.e., number two crusher run stone or equal) layer is recommended as the base course for the proposed addition heavy-duty concrete floor slab. The NYSDOT specification numbers for typical aggregate subbase/base course components are Item No. 304.12 (Metric) Subbase Course, Type 2 (< 2-inch maximum), which is preferred, or Item No. 304.14 (Metric) Subbase Course, Type 4 (< 2-inch maximum). This select granular base layer would be compacted to a minimum 95 percent of the

maximum dry density by ASTM D 1557. The floor slab for the proposed addition is recommended to be a six-inch minimum thickness or is as determined by the design structural engineer. The floor slab reinforcement should be provided through placement of wire mesh or plastic fibers and is also as determined by the design structural engineer.

At the discretion of the design architect, a vapor barrier may be considered for use in the proposed structure. The use of a thin gravel cushion, as a capillary break, or a thin sand cushion over a vapor barrier that is placed beneath the concrete slab(s) are at the discretion of the design architect/engineer or as required by local code. Gradations of gravels that are satisfactory capillary breaks include 1 ¼-inch or ¾-inch crushed stone or aggregate per the ASTM D2321 Types IA, IB and II with less than 5 % fines. A number two crusher run stone may also be applicable, but the gradation and material property specifications must qualify.

At the assumed final site grade and based upon the thickness and character of the underlying fill and natural soils, the subgrade modulus is recommended not to exceed 150 pounds per cubic inch (pci). A Poisson Ratio of 0.4 is recommended for design purposes. Isolation of the floor slabs from the footings-piers-columns and walls do appear to be warranted. Based upon the subgrade modulus and slab mechanical properties and thickness, the design structural engineer may accordingly adjust the granular aggregate base thickness.

Exterior Concrete Slabs-On-Grade/Pad/Parking and Roadway Facilities: The characteristics of the natural soils and the known frost penetration in Western New York require that specific attention is provided to the design and construction of paved roadway and parking areas. For new pavement sections, isolated pockets of surficial silty/cohesive/fine-grained soil/fill may be encountered and may be too soft and wet in the proposed parking and roadway areas. These types of soil/fill may be adequately conditioned (i.e., dried and blended) and compacted (i.e., minimum 90 percent compaction) to support necessary construction equipment and normal pavement section. Otherwise, the removal/undercutting of the silty/cohesive/fine-grained soil/fill to a firm, approved subgrade and subsequent placement and compaction of select or approved granular fill will be required in order to accommodate the recommended pavement sections.

For new pavement sections, it is recommended that the subgrade surface is adequately graded and/or underdrains are installed to prevent water accumulation. Above the approved subgrade surface (i.e., minimum 90 percent compaction), a minimum eight-inch thick select granular layer is recommended as the base course for lightly traveled roadway and parking areas (standard duty section). A geotextile filter and strength fabric (such as, Mirafi 600X or equal) and minimum 12-inch thick base course are recommended for all truck routes and heavily traveled roadways (heavy duty section). If “pumping” of the

silty/cohesive/fine-grained soil subgrade occurs or is difficult to stabilize during construction, an increase in the base thickness to that of the heavy-duty section and/or a geotextile filter and strength fabric is recommended to be placed on the prepared and approved subgrade for the standard duty section. The NYS Department of Transportation (NYSDOT) specification numbers for typical aggregate subbase/base course components are Item No. 304.12 (Metric) Subbase Course, Type 2 (< 2-inch maximum size), which is preferred, or Item No. 304.14 (Metric) Subbase Course, Type 4 (< 2-inch maximum size). The granular aggregate base layer is recommended to be compacted to at least 95 percent of maximum dry density by ASTM D1557.

The thickness of top and binder course layers should be determined in accordance with AASHTO methods. In summary, the minimum recommended asphalt thicknesses for the heavy-duty section and standard duty section are three and one-half inches and three inches, respectively. The top and binder course layers are recommended to be designed and constructed in accordance with New York State Department of Transportation Standard Specification.

Limitations, Field Inspections and Monitoring: This report is based on the preliminary information that is provided by project representatives and the subsurface conditions that were encountered at the test boring locations. Due to the nature of the investigation method, test pit excavation will provide a greater level of delineation of the subsurface soil/fill/rock conditions than can be defined by the test boring data alone. As detailed in Appendix F "Limitations", modification regarding proposed building/structure locations and other site developments can result in changes to provided recommendations. It is recommended that the geotechnical engineer be provided the opportunity to generally review the final detailed design and contract specifications. Required earthwork and foundation construction should be done under the supervision of experienced construction personnel and in a manner consistent with proven methods. All site work should be carefully monitored and tested by experienced geotechnical personnel to assure compliance with earthwork and foundation construction specifications.

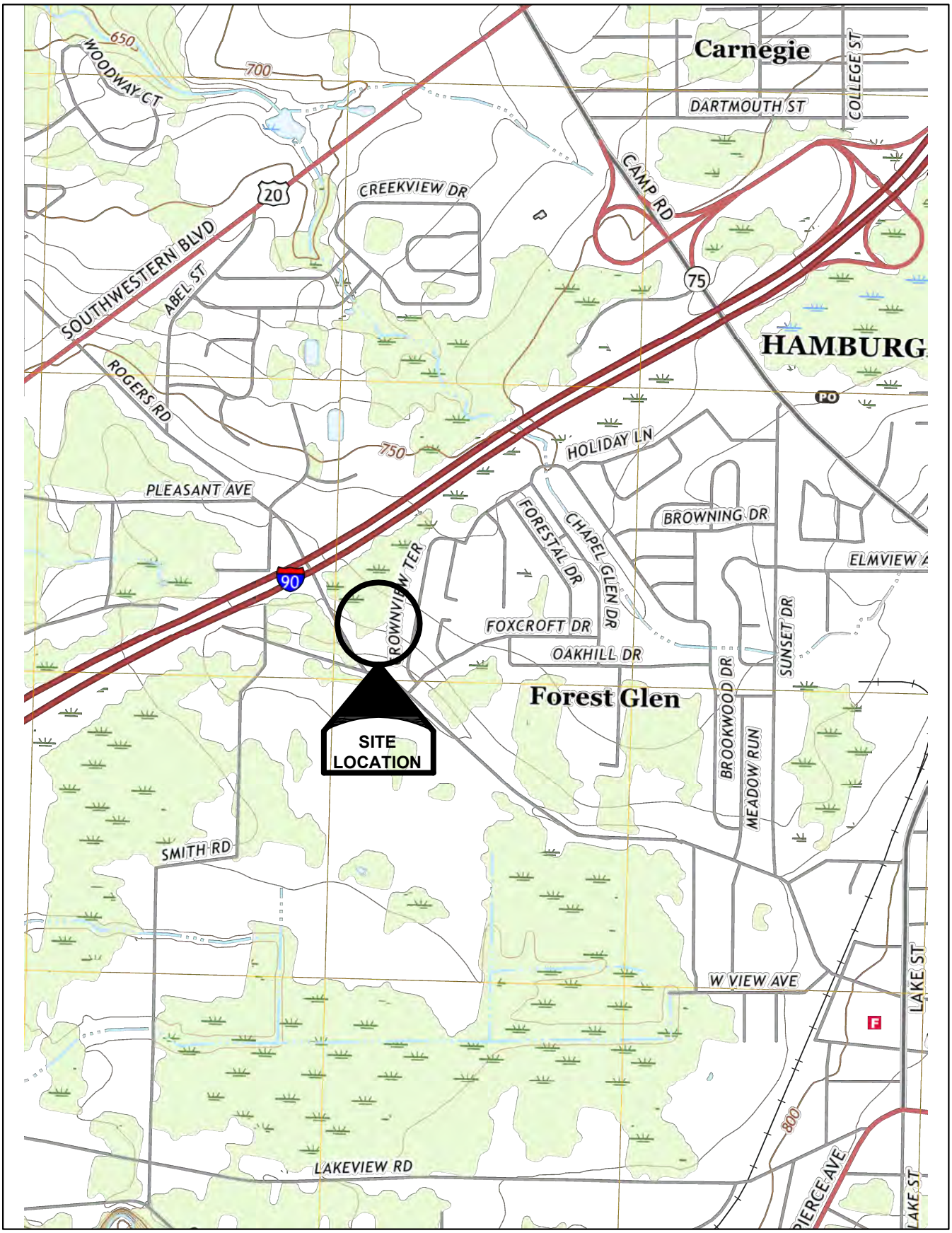
Thank you for the opportunity to assist on this project. If questions should arise, please call the undersigned at your earliest convenience.

Very truly yours,
BARRON & ASSOCIATES, INC.
and
BUFFALO DRILLING COMPANY, INC.

James S. Barron, PE
President/Geotechnical Engineer

www.barronandassociatespc.com

6-4-20



BARRON & ASSOCIATES, P.C. &
BUFFALO DRILLING COMPANY
10440 MAIN ST.
CLARENCE, NY 14031
(716)759-7821
FAX (716)759-7823
INFO@BUFFALODRILLING.COM
INFO@BARRONANDASSOCIATESPC.COM

DRAWN: DAN KASPROWICZ

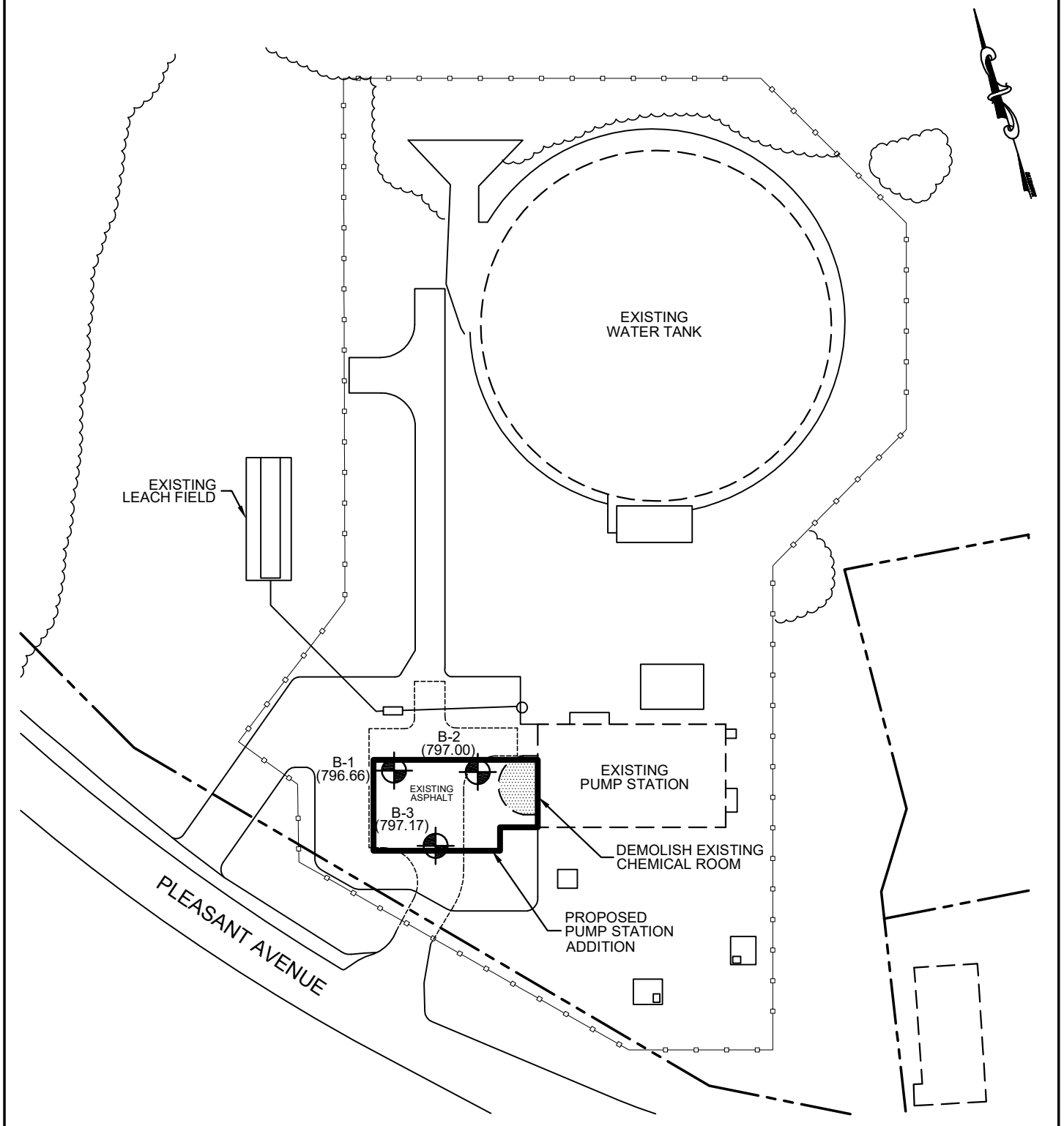
CLIENT: GHD CONSULTING SERVICES, INC.
285 DELAWARE AVENUE, SUITE 500
BUFFALO, NEW YORK 14202

PROJECT: PROPOSED GUENTHER PUMP STATION EXPANSION
3478 PLEASANT AVENUE
TOWN OF HAMBURG, ERIE CO., NEW YORK 14075

NEW YORK STATE
SITE LOCATION

USGS SITE LOCATION PLAN
HAMBURG
2019

JOB NO.: 20-537	SCALE: N.T.S.
DATE: 5/4/2020	FIGURE NO. 1



LEGEND	
B-2	= TEST BORING & NO.
(797.00)	= RELATIVE GROUND SURFACE ELEVATION (FT.)

NOTES:

1. BORINGS, BUILDINGS, SITE FEATURES, PROPERTY LINE LOCATIONS, & SCALE OF DRAWING ARE APPROXIMATE.
2. BASE MAP REFERENCE PROVIDED BY GHD CONSULTING SERVICES, INC., TITLED "EXISTING SITE AND DEMOLITION PLAN", SHEET NO. C001, PROJECT NO. 111-83699, LAST REVISION DATED 3/20/2020.

BARRON & ASSOCIATES, P.C. &
BUFFALO DRILLING COMPANY
10440 MAIN ST.
CLARENCE, NY 14031
(716)759-7821
FAX (716)759-7823
INFO@BUFFALODRILLING.COM
INFO@BARRONANDASSOCIATESPC.COM

DRAWN: DAN KASPROWICZ

CLIENT: GHD CONSULTING SERVICES, INC.
285 DELAWARE AVENUE, SUITE 500
BUFFALO, NEW YORK 14202

PROJECT: PROPOSED GUENTHER PUMP STATION EXPANSION
3478 PLEASANT AVENUE
TOWN OF HAMBURG, ERIE CO., NEW YORK 14075

TEST BORING LOCATION PLAN

0 30 60 120

JOB NO.: 20-537	SCALE: 1" = 60' ±
DATE: 5/18/2020	FIGURE NO. 2

BARRON & ASSOCIATES, P.C.
Geotechnical Consulting and Special Inspections
10440 Main Street (716) 759-7821
Clarence, NY 14031 www.barronandassociatespc.com

B&A JOB NO: 20-537
CLIENT: GHD Consulting Services, Inc.
PROJECT: Proposed Guenther Pump Station Expansion
3478 Pleasant Avenue
Town of Hamburg, Erie Co., New York 14075

TABLE NO. 1
LABORATORY PHYSICAL SOIL TEST RESULTS

Boring No.	Sample No.	Depth	Moisture Content ASTM D2216	Organic Matter Content ASTM D2974	Grain Size Analysis ASTM D422				Atterberg Limits ASTM D4318			USCS Soil Classification ASTM D2487 / ASTM D2488 *
					Gravel	Sand	Silt	Clay	LL	PL	PI	
		(ft.)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(-)
B-1	S-1	1-2	9.0	-	-	-	-	-	-	-	-	CL/ML-Till
	S-2	2-4	5.2	-	-	-	-	-	-	-	-	CL/ML-Till
	S-3	4-6	5.7	-	-	-	-	-	-	-	-	CL/ML-Till
	S-4	6-8	16.0	-	-	-	-	-	-	-	-	CL/ML-Till
	S-5	8-10	8.9	-	-	-	-	-	-	-	-	CL/ML-Till
	S-6	10-11	-	-	-	-	-	-	-	-	-	NO SAMPLE
B-2	S-1	0-2	9.3	-	-	-	-	-	-	-	-	CL/ML-Till
	S-2	2-4	9.3	-	-	-	-	-	-	-	-	CL/ML-Till
	S-3	4-6	9.0	-	-	-	-	-	26	20	6	CL/ML-Till
	S-4	6-8	21.9	-	-	-	-	-	-	-	-	CL/ML-Till
	S-5	8-10	16.0	-	-	-	-	-	-	-	-	CL/ML-Till
	S-6	10-12	-	-	-	-	-	-	-	-	-	NO SAMPLE
	C-3	20.7-21	1.2	-	-	-	-	-	-	-	-	SHALE
B-3	S-1	1-2	7.0	-	-	-	-	-	-	-	-	CL/ML-Till
	S-2	2-4	9.1	-	-	-	-	-	-	-	-	CL/ML-Till
	S-3	4-6	12.6	-	-	-	-	-	-	-	-	CL/ML-Till
	S-4	6-8	9.1	-	-	-	-	-	-	-	-	CL/ML-Till
	S-5	8-10	4.9	-	-	-	-	-	-	-	-	WEATHERED SHALE
	S-6	10-12	-	-	-	-	-	-	-	-	-	NO SAMPLE

* Soil classification based on visual identification and soil classification of adjacent samples (as applicable).

BARRON & ASSOCIATES, P.C.
Geotechnical Consulting and Special Inspections
10440 Main Street (716) 759-7821
Clarence, NY 14031 www.barronandassociatespc.com

B&A JOB NO: 20-537
CLIENT: GHD Consulting Services, Inc.
PROJECT: Proposed Guenther Pump Station Expansion
3478 Pleasant Avenue
Town of Hamburg, Erie Co., New York 14075

TABLE NO. 2

SUMMARY TABLE OF BEDROCK UNIAXIAL COMPRESSIVE STRENGTH TESTS

Test Boring No.	Core Run No.	Sample Location		Moisture Content ASTM D2216	Uncapped Length / Diameter ASTM D2938	Failure Type	Maximum Compressive ASTM D2938			Rock Identification ASTM C294
		Depth Interval	Elevation Interval				Load	Strength		
		(ft.)	(ft.)	(%)	(in. / in.)	(-)	(lbs.)	(tsf)	(psi)	
B-2	C-3	20.7 - 21.0	776.3 - 776.0	1.2	3.62 / 2.04	COLUMNAR	16,630	360*	5,005*	RHINESTREET SHALE

* Strength corrected for specimen length-to-diameter ratio less than two.
1. Ends of sample capped prior to testing.
2. Sample appeared absent of limiting structures (fracture planes, vugs, etc.).
3. Rock identification based on the local geology according to New York State Geologic Maps.

BARRON & ASSOCIATES, P.C.
Geotechnical Consulting and Special Inspections
10440 Main Street
Clarence, NY 14031
(716) 759-7821
www.barronandassociatespc.com

APPENDIX A

TEST BORING LOGS

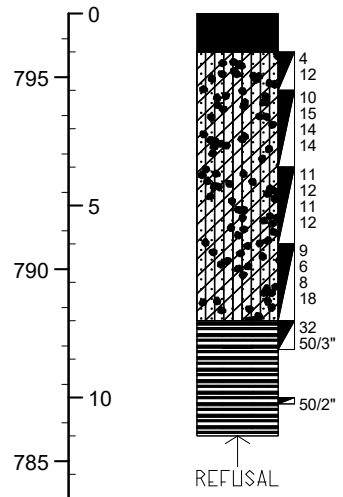
BARRON & ASSOCIATES, P.C. &
BUFFALO DRILLING COMPANY, INC.
10440 MAIN STREET
CLARENCE, NEW YORK 14031
(716) 759-7821 FAX: (716) 759-7823

TEST BORING LOG

JOB No.: 20-537 **BORING No.:** B-1

PROJECT: Proposed Guenther Pump Station Expansion
3478 Pleasant Avenue, Town of Hamburg, Erie Co., New York 14075

DRILLER:	J. Gardner	**TYPE OF DRILL RIG:**	Diedrich D-50 (Truck)
SAMPLING METHODS:	ASTM D1586	**SIZE AND TYPE OF BIT:**	2 1/4" I.D. H.S.A.
DATE STARTED:	5/12/20	**SURFACE ELEVATION (ft.):**	796.66
DATE COMPLETED:	5/12/20	**GROUNDWATER DEPTH (ft.):** (measured at completion unless indicated below)	None



Sample No. : Range	N-Value	% REC (RQD)	Soil and Rock Description / Remarks
			Asphalt (12")
S-1 : 1.0'- 2.0'	16	75	Brown, v. stiff CLAY and SILT, little sand to gravel sized Shale fragments, sl. plastic, moist (CL/ML-Till)
S-2 : 2.0'- 4.0'	29	60	Same as S-1
S-3 : 4.0'- 6.0'	23	50	Same as S-1
S-4 : 6.0'- 8.0'	14	60	...grade: stiff
S-5 : 8.0'- 8.8'	50+	40	Gray, v. dense sand to gravel sized WEATHERED SHALE fragments, moist (WEATHERED SHALE)
S-6 : 10.0'- 10.2'	50+	0	Same as S-5 (No Recovery)
			Depth to Bottom of Hole: 11.0 feet

Logged by: B. Smith

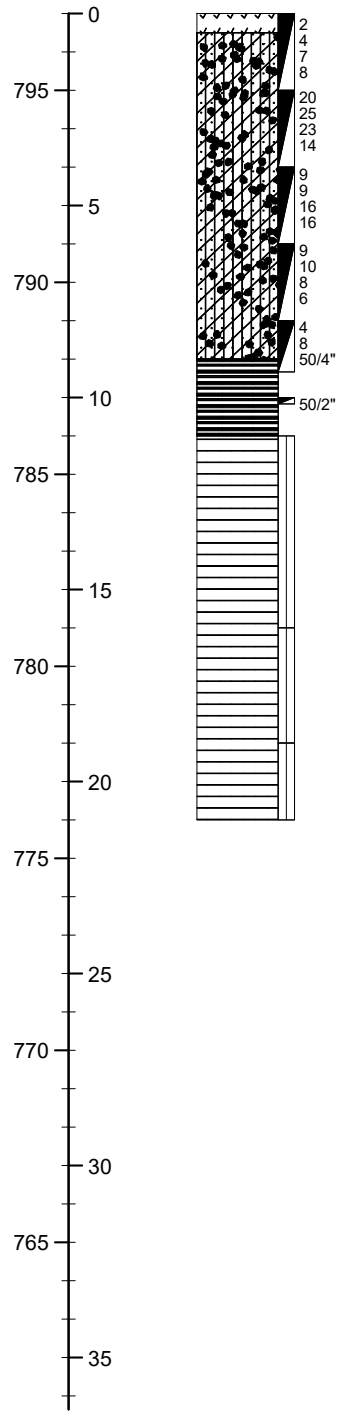
BARRON & ASSOCIATES, P.C. &
BUFFALO DRILLING COMPANY, INC.
10440 MAIN STREET
CLARENCE, NEW YORK 14031
(716) 759-7821 FAX: (716) 759-7823

TEST BORING LOG

JOB No.: 20-537 **BORING No.:** B-2

PROJECT: Proposed Guenther Pump Station Expansion
3478 Pleasant Avenue, Town of Hamburg, Erie Co., New York 14075

DRILLER:	J. Gardner	**TYPE OF DRILL RIG:**	Diedrich D-50 (Truck)
SAMPLING METHODS:	ASTM D1586 & D2113	**SIZE AND TYPE OF BIT:**	4 1/4" H.S.A. & NX Core
DATE STARTED:	5/12/20	**SURFACE ELEVATION (ft.):**	797.00
DATE COMPLETED:	5/12/20	**GROUNDWATER DEPTH (ft.):** (measured at completion unless indicated below)	None



Sample No. : Range	N-Value	% REC (RQD)	Soil and Rock Description / Remarks
			Topsoil (6")
S-1 : 0.0'- 2.0'	11	60	Brown, stiff CLAY and SILT, little sand to gravel sized Shale fragments, sl. plastic, moist (CL/ML-Till)
S-2 : 2.0'- 4.0'	48	70	...grade: hard
S-3 : 4.0'- 6.0'	25	60	...grade: v. stiff
S-4 : 6.0'- 8.0'	18	80	Same as S-3
S-5 : 8.0'- 9.3'	58+	60	...grade: hard
S-6 : 10.0'- 10.2'	50+	0	Gray, v. dense sand to gravel sized WEATHERED SHALE fragments, moist (WEATHERED SHALE) Same as S-5 (No Recovery)
C-1 : 11.0'- 16.0'	-	72.5 (0)	WEST FALLS FORMATION: med. lt. gray, dense, band, SHALE, porous, argillaceous, sl. weathered, mod. hard (RHINESTREET SHALE MEMBER) # pieces > 1" = 5 # pieces > 4" = 0 longest piece = 1.25"
C-2 : 16.0'- 19.0'	-	99.3 (0)	Same as C-1 # pieces > 1" = 20 # pieces > 4" = 0 longest piece = 3.0"
C-3 : 19.0'- 21.0'	-	99.8 (0)	Same as C-1 # pieces > 1" = 7 # pieces > 4" = 0 longest piece = 3.75"

Depth to Bottom of Hole: 21.0 feet

Logged by: B. Smith

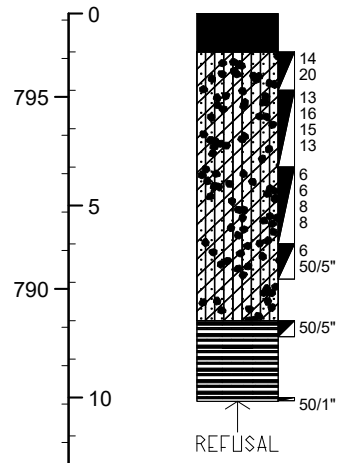
BARRON & ASSOCIATES, P.C. &
BUFFALO DRILLING COMPANY, INC.
10440 MAIN STREET
CLARENCE, NEW YORK 14031
(716) 759-7821 FAX: (716) 759-7823

TEST BORING LOG

JOB No.: 20-537 **BORING No.:** B-3

PROJECT: Proposed Guenther Pump Station Expansion
3478 Pleasant Avenue, Town of Hamburg, Erie Co., New York 14075

DRILLER:	J. Gardner	**TYPE OF DRILL RIG:**	Diedrich D-50 (Truck)
SAMPLING METHODS:	ASTM D1586	**SIZE AND TYPE OF BIT:**	2 1/4" I.D. H.S.A.
DATE STARTED:	5/12/20	**SURFACE ELEVATION (ft.):**	797.17
DATE COMPLETED:	5/12/20	**GROUNDWATER DEPTH (ft.):** (measured at completion unless indicated below)	None



Sample No. : Range	N-Value	% REC (RQD)	Soil and Rock Description / Remarks
			Asphalt (12")
S-1 : 1.0'- 2.0'	34	75	Brown, hard CLAY and SILT, little sand to gravel sized Shale fragments, sl. plastic, moist (CL/ML-Till)
S-2 : 2.0'- 4.0'	31	60	Same as S-1
S-3 : 4.0'- 6.0'	14	75	...grade: stiff
S-4 : 6.0'- 6.9'	50+	50	...grade: hard
S-5 : 8.0'- 8.4'	50+	20	Gray, v. dense sand to gravel sized WEATHERED SHALE fragments, moist (WEATHERED SHALE)
S-6 : 10.0'- 10.1'	50+	0	Same as S-5 (No Recovery)

Depth to Bottom of Hole: 10.1 feet

Logged by: B. Smith

BARRON & ASSOCIATES, P.C.
Geotechnical Consulting and Special Inspections
10440 Main Street
Clarence, NY 14031
(716) 759-7821
www.barronandassociatespc.com

APPENDIX B

GEOTECHNICAL REFERENCE STANDARDS

BARRON & ASSOCIATES, P.C.
Geotechnical Consulting and Special Inspections
10440 Main Street (716) 759-7821
Clarence, NY 14031 www.barronandassociatespc.com

Column Header Descriptions

BARRON & ASSOCIATES, P.C. &
BUFFALO DRILLING COMPANY, INC.
10440 MAIN STREET
CLARENCE, NEW YORK 14031
(716) 759-7821 FAX: (716) 759-7823

TEST BORING LOG

JOB No.: BORING No.:

PROJECT:

EXAMPLE

DRILLER:
SAMPLING METHODS:
DATE STARTED:
DATE COMPLETED:

TYPE OF DRILL RIG:
SIZE AND TYPE OF BIT:
SURFACE ELEVATION (ft.):
GROUNDWATER DEPTH (ft.):
(measured at completion unless indicated below)

Elevation/ Depth (feet)	Soil Symbols Sampler Symbols Field Test Data	Sample No. : Range	N-Value	% REC (RQD)	Soil and Rock Description / Remarks
100 — 0	1 1 1 2 / 6 8 11 14	S-1 : 0.0'- 2.0'	2	50	Dk. brown, soft, CLAY, some Silt, little f. Sand, tr. Gravel, tr. Roots, tr. Organic matter, mod. plastic, wet (CL)
		S-2 : 2.0'- 4.0'	19	50	Brown, m. dense f. SAND, some Silt, tr. Gravel, tr. Clay, tr. Roots, non-plastic, moist (SM)

Elevation/Depth: The depth column provides the vertical scale of the boring log in feet below ground surface.

Sample No. : Range: Disturbed samples are identified with “S” preceding the sample number. Undisturbed (Shelby-tube) samples are identified with “U” preceding the sample number. Rock core samples identified with “C” preceding the core run. The range of elevation/depth where the sample was taken is identified in one-tenth foot increments.

N-value: The Standard Penetration Test N-value, as specified by ASTM D1586, is defined as the number of blows required by a 140-pound hammer falling 30 inches, each blow, to drive a 2-in outside diameter split-spoon sampler 12 inches.

% REC (RQD): “Percent Recovery” is the length of samples recovered divided by the total length sampled. The result is numerically expressed as a percent. The Rock Quality Designation (RQD) is the total length of places >4 inches divided by the total length of core run.

Soil and Rock Description / Remarks: This column denotes the exact depth of recovery and general documentation of drilling efforts. Description and classification are based on visual inspection of samples and boring operations. The stratum lines shown on the boring logs are based upon interpretation and may not represent precise subsurface conditions. Water-level readings have been made in the drill holes at time under conditions stated on the boring logs. Fluctuations in the water level may occur due to other factors than those present the time measurement was taken. See attached sheet.

BARRON & ASSOCIATES, P.C.
Geotechnical Consulting and Special Inspections
10440 Main Street
Clarence, NY 14031
(716) 759-7821
www.barronandassociatespc.com

Soil and Rock Description / Remarks: Terminology Used for Soil Description

Density Description of Granular Soil

Number of Blows per ft., N	*Relative Density*
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium
30 - 50	Dense
Over 50	Very Dense

Abbreviations Used in Soil Sample Classification

f - fine	v - very
m - medium	gr - gray
c - coarse	bn - brown
f/m - fine to medium	yel - yellow
f/c - fine to coarse	sl - slight
tr - trace	dk - dark

Consistency Description of Cohesive Soil

Number of Blows per ft., N	*Consistency*
Below 2	Very Soft
2 - 4	Soft
4 - 8	Medium
8 - 15	Stiff
15 - 30	Very Stiff
Over 30	Hard

Bedding

Parting	Less than 0.02 ft.
Band	0.02 - 0.2 ft.
Thin bed	0.2 - 0.5 ft.
Medium bed	0.5 - 1.0 ft.
Thick bed	1.0 - 2.0 ft.
Massive	Over 2.0 ft.

Grain Size

	Passing / Retained on
Boulder	LARGE / 12-in sieve
Cobble	12-in / 3-in sieve
Gravel	3-in sieve / No. 4 sieve
	No. 4 sieve / No. 10 sieve
Sand	No. 10 sieve / No. 40 sieve
	No. 40 sieve / No. 200 sieve
Silt	No. 200 sieve / 0.005 mm sieve
Clay	Smaller than 0.005 mm

Hardness

Very Soft or Plastic	Can be indented with thumb
Soft	Can be scratched with fingernail
Moderately Hard	Can be scratched with knife
Hard	Difficulty to scratch with knife
Very hard	Cannot be scratched with knife

Percentage Terminology Used in Soil Classification

Trace	0 - 10 %	Some	20 - 35 %
Little	10 - 20 %	And	35 - 50 %

Moisture

Dry	Absence of moisture, dusty, dry to the touch.
Moisture	Small quantity of moisture. Soil usually above groundwater level.
Wet	Moisture noticeable to the touch. Soil may be below groundwater level.
Saturated	Visible free water, usually soil is below groundwater level.

Plasticity

Non-plastic	An 1/8-in thread cannot be rolled at any water content.
Slight plasticity	Thread can be barley rolled.
Moderate plasticity	Thread is easy to roll and little time is required to reach the plastic limit (PL).
Plasticity	Considerable time is required to reach PL. Thread can be re-rolled several times after reaching the PL.

Crystallinity or Texture

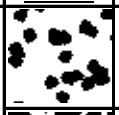
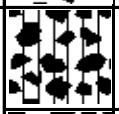
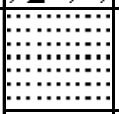
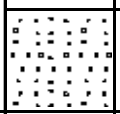
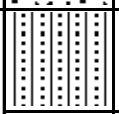
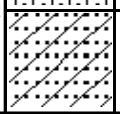
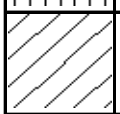
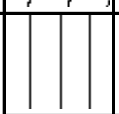
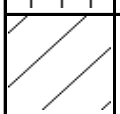
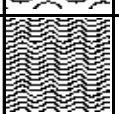
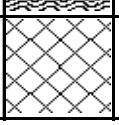
Dense	Crystals are to small they cannot be distinguished with the naked eye.
Very Fine Crystalline	Crystals barely discernable with the naked eye.
Crystalline	Crystals are medium size, up to 1/8-in diameter.
Very Coarsely Crystalline	Crystals larger than 1/8-in diameter.

Voids

Porous	Smaller than pinhead. Their presence is indicated by the degree of absorbency.
Pitted	Pinhead size to 1/4 in. If thin walls separate the individuals pits, the core may be described as honeycomb.
Vug	1/4 inch to the diameter of the core. The upper limit will vary with core size.
Cavity	Larger than the diameter of the core.

BARRON & ASSOCIATES, P.C.
Geotechnical Consulting and Special Inspections
10440 Main Street (716) 759-7821
Clarence, NY 14031 www.barronandassociatespc.com

Soil Classification Chart: Unified Soil Classification System (USCS)

Major Divisions			Pattern	USCS ID	Typical Descriptions
Coarse-Grained Soils: More than 50% of material larger than No. 200 sieve	**Gravels**: More than 50% of coarse fraction larger than No. 4 sieve	Clean Gravels (little or no fines)		GW	Well-graded gravels, gravel-sand mixtures, little or no fines
				GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
		Gravels with appreciable amounts of fines		GM	Silty gravels, gravel-sand-silt mixtures
				GC	Clayey gravels, gravel-sand-silt mixtures
	Sands: Less than 50% of coarse fraction larger than No. 4 sieve	Clean sands (little or no fines)		SW	Well-graded sands, gravelly sands, little or no fines
				SP	Poorly-graded sands, gravelly sands, little or no fines
		Sand with appreciable amount of fines		SM	Silty sands, silt-sand mixtures
				SC	Clayey sands, sand-clay mixtures
Fine-Grained Soils: Less than 50% of material larger than No. 200 sieve	**Silts and Clays, Low plasticity**: Liquid Limit < 50%			ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
				CL	Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays
				OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays, High plasticity: Liquid Limit > 50%			MH	Inorganic silts, micaceous or diatomaceous fine sand or silty soils
				CH	Inorganic clays of high plasticity, fat clays
				OH	Organic clays of medium to high plasticity, organic silts
Highly Organic Soils				Pt	Peat, humus, swamp soils with organic contents
Miscellaneous Fill				FILL	Miscellaneous fill may belong in any division but is identified as FILL

BARRON & ASSOCIATES, P.C.
Geotechnical Consulting and Special Inspections
10440 Main Street
Clarence, NY 14031
(716) 759-7821
www.barronandassociatespc.com

APPENDIX C

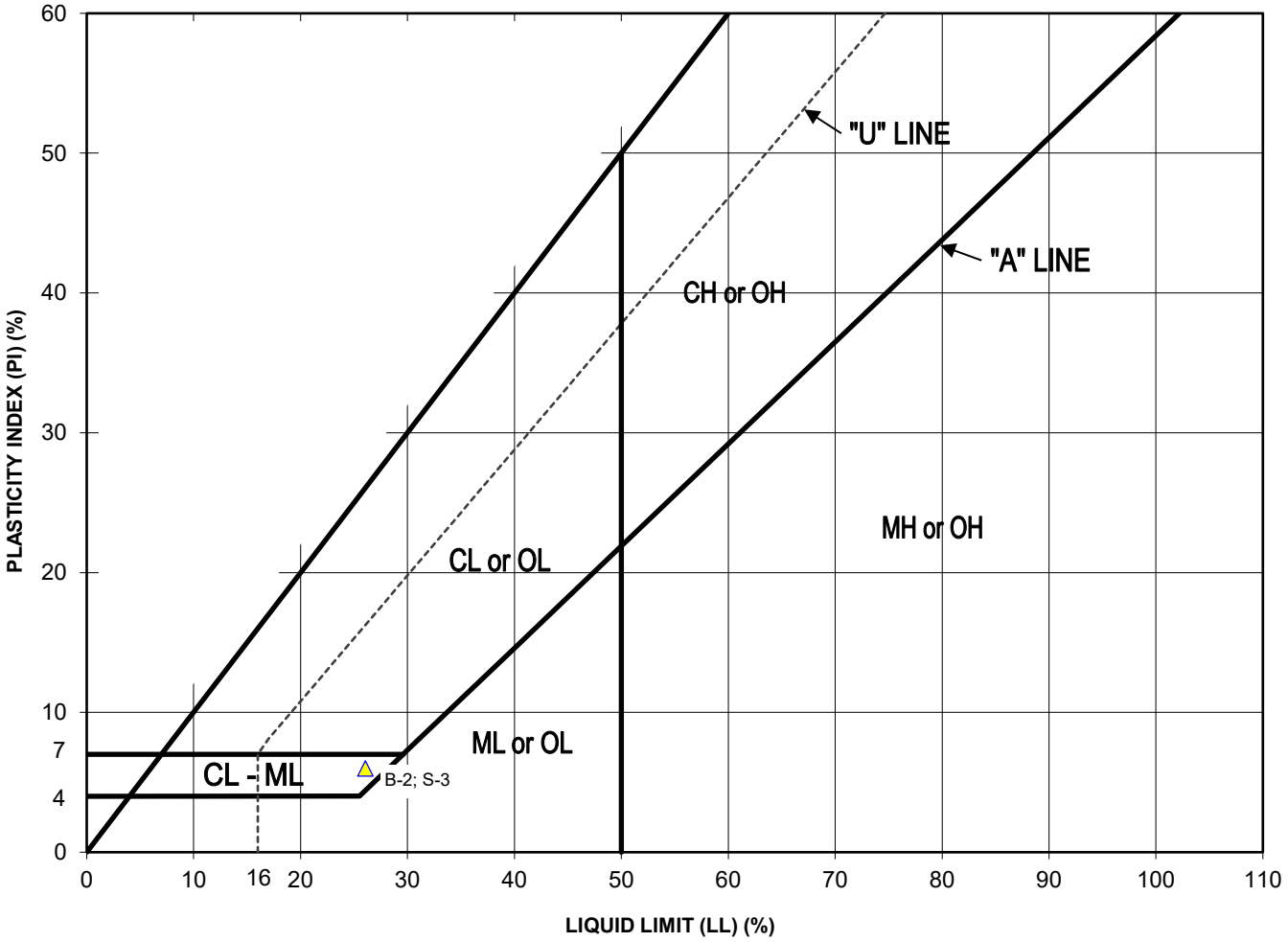
LABORATORY SOIL TEST RESULTS

BARRON & ASSOCIATES, P.C.
Geotechnical Consulting and Special Inspections
10440 Main Street
Clarence, NY 14031
(716) 759-7821
www.barronandassociatespc.com

Job No: 20-537
Project: Proposed Guenther Pump Station Expansion
3478 Pleasant Avenue
Town of Hamburg, Erie Co., New York 14075

Plasticity Chart

ASTM D4318 & D2487



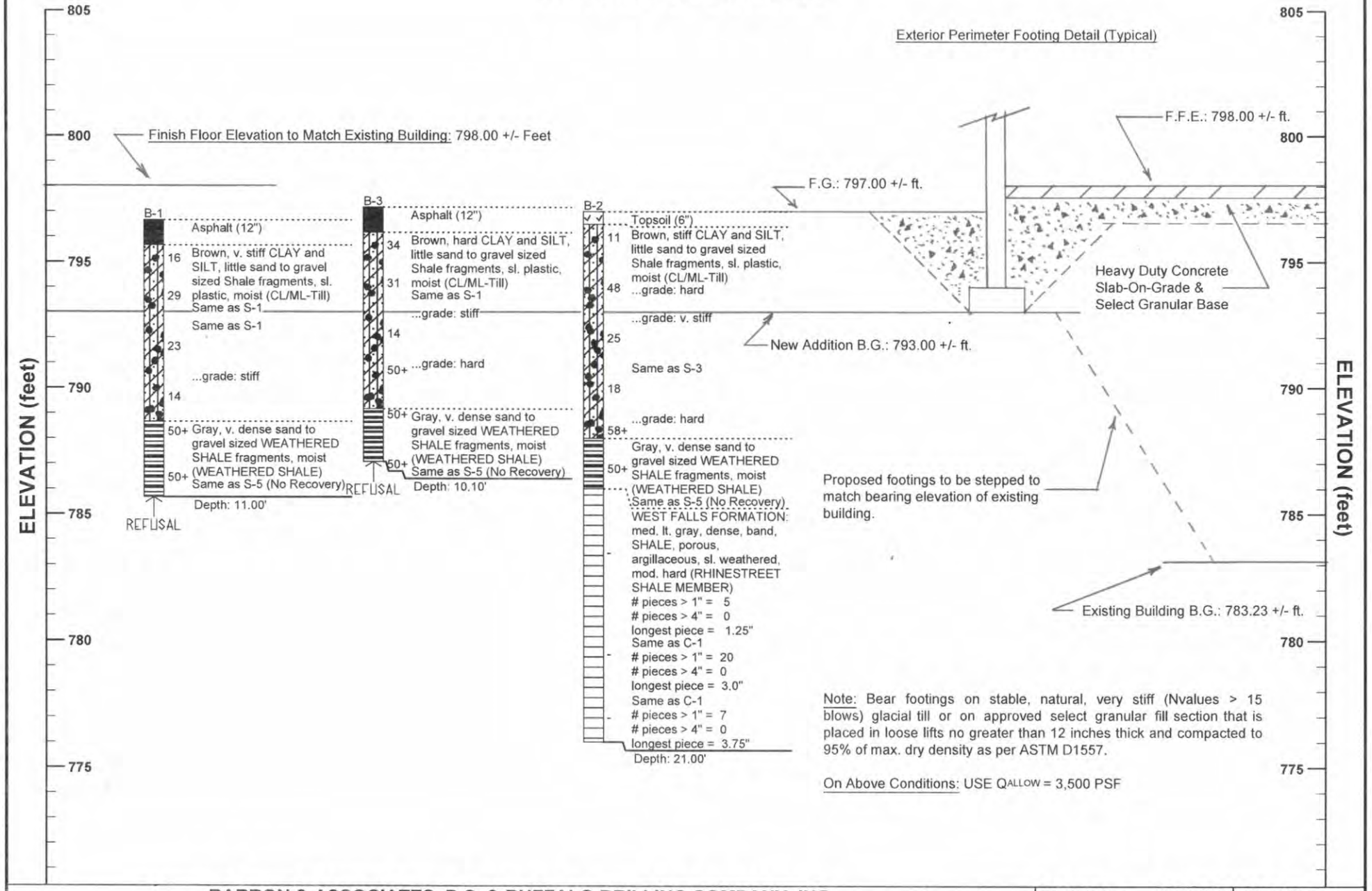
Boring No.	Sample No.	Depth (ft.)	LL (%)	PL (%)	PI (%)
B-2	S-3	4-8	26	20	6

BARRON & ASSOCIATES, P.C.
Geotechnical Consulting and Special Inspections
10440 Main Street
Clarence, NY 14031
(716) 759-7821
www.barronandassociatespc.com

APPENDIX D

ENGINEERING COMPUTATIONS AND SCHEMATICS

"PROFILE OF BORINGS"



BARRON & ASSOCIATES, P.C. & BUFFALO DRILLING COMPANY, INC. 10440 MAIN STREET, CLARENCE, NEW YORK 14031	PLOTTED: 5/26/2020 BY: A. Camping	JOB NO.: 20-537
PROJECT: Proposed Guenther Pump Station Expansion 3478 Pleasant Avenue, Town of Hamburg, Erie Co., New York 14075	PAGE NO.: 1 of 3	FIGURE NO.: P-1

BARRON & ASSOCIATES, P.C.
Geotechnical Consulting and Special Inspections
10440 Main Street (716) 759-7821
Clarence, NY 14031 www.barronandassociatespc.com

DATA INPUT BY: Andrew J. Camping
B&A JOB NO.: 20-537
CLIENT: GHD Consulting Services, Inc.
PROJECT: Proposed Guenther Pump Station Expansion
3478 Pleasant Avenue
Town of Hamburg, Erie Co., New York 14075

BUILDING CODE OF NEW YORK STATE © - 2010: USGS 2008 ACCELERATIONS at 2% IN 50 YEARS CALCULATED BY LATITUDE AND LONGITUDE

Site Latitude (○) = +42.7304

Site Longitude (○) = -78.8611

Seismic Site Class = C

Building/Structure with Shallow Foundation

S_s = 0.2 sec acceleration value for Class B (in g's)

Acceleration Values Below are S_s

LAT. = \ LONG. =	-78.9000	-78.8611	-78.8500
42.7000	0.19796		0.19957
+42.7304	0.20119	0.20242	0.20277
42.7500	0.20328		0.20484

S_1 = 1.0 sec acceleration value for Class B (in g's)

Acceleration Values Below are S_1

LAT. = \ LONG. =	-78.9000	-78.8611	-78.8500
42.7000	0.04875		0.04899
+42.7304	0.04903	0.04921	0.04926
42.7500	0.04921		0.04944

SEISMIC SITE CLASS	Site Coefficient and Design Spectral Response Acceleration Values			
	0.2 Second		1.0 Second	
	F_a	$S_{ds} = 0.6667 * F_a * S_s$	F_v	$S_{d1} = 0.6667 * F_v * S_1$
A	0.8000	0.1080 g	0.8000	0.0262 g
B	1.0000	0.1350 g	1.0000	0.0328 g
C	1.2000	0.1619 g	1.7000	0.0558 g
D	1.6000	0.2159 g	2.4000	0.0787 g
E	2.5000	0.3374 g	3.5000	0.1148 g
F	2.5000	0.3374 g	3.5000	0.1148 g

<<------- USE THESE VALUES FOR SHALLOW FOUNDATIONS

NOTE: F_a and F_v values are linearly interpolated, for the above S_s and S_s values, respectively, within the appropriate range of the mapped spectral response accelerations.
(Gridded data at 0.05 degree increments from: http://earthquake.usgs.gov/research/hazmaps/products_data/2012/data/)

BARRON & ASSOCIATES, P.C.
Geotechnical Consulting and Special Inspections
10440 Main Street (716) 759-7821
Clarence, NY 14031 www.barronandassociatespc.com

LATERAL EARTH PRESSURE ON GENERIC BLOCK FOUNDATIONS FOR SIGNS, FREE-STANDING RETAINING WALLS, OR BELOW GRADE/BASEMENT/TANK/POOL RETAINING WALLS (Less Than 20 Feet High)

a) Porous filter media, in contact with the basement/below grade foundation wall or retaining walls, protects and is in contact with a minimum 4 inch diameter perforated drainage pipes at the footing/base of the foundation/structural wall (exterior backfill side and interior basement side) and/or weep pipes through the wall, as needed and as applicable.

b) Where recommended, a geotextile filter fabric will protect the gravel filter media from the earth backfill. Overlap unsewn seams as per the manufacturer's recommendations.

c) Waterproof earth side of wall, as is customarily provided in practice.

d) Drainage pipes are connected to an appropriately designed collector pipe, conveyance, and/or sump pump system as is applicable for the intended purpose of the wall and as customarily provided/installed in practice.

e) For potential groundwater table conditions above the top of the basement slab-on-grade condition, install continuous waterstops (with no joints in stop) at wall and floor construction joints, as is customarily provided in practice. Interior intermediate drainage pipes beneath the slab, that are spaced on-center and in both directions, do appear to be needed.

f) Assume a uniformly graded, clean coarse sand or sandy gravel backfills:
* equivalent N-value in a dense state: $(N_1)_{60}$ = 40 blows/foot
* friction angle: ϕ' = 38 degrees {Teng, pg. 12}
* average in-place densities: moist - γ_m = 120 pcf
saturated - γ_{sat} = 132 pcf submerged - $\gamma' = (\gamma_{sat} - \gamma_w) = 70$ pcf

g) Assume at base of wall/footing, coefficient of friction against sliding (f_s) at base of wall (Refer to Teng, pg. 320-1):
$f_s = \tan(0.58 \times \phi') = 0.40$ (AREA silty soil to silty coarse-grained soil)

h) Use equivalent fluid pressure design approach {Hough, pg. 249 and NAVFAC pg. 7-10-9}:
* at rest pressure coefficient - $K_0 = 1 - \sin(\phi') = 0.38$
* effective lateral pressure of soil - $\gamma'_l = K_o \times \gamma' = 26.6$ pcf
* hydrostatic pressure - γ_w = 62.4 pcf
* equivalent fluid pressure with water level - at the top of the grade at the wall $\gamma_{eo} = \gamma'_l + \gamma_w = 89$ pcf (say 90 pcf)
* equivalent fluid pressure with compaction induced lateral stress increase (W&F, pg 409) $\gamma_{eo} = 2 \times K_o \times \gamma_m = 91$ pcf (say 90 pcf)
* active pressure case - $K_a = [1 - \sin(\phi')] / [1 + \sin(\phi')] = 0.24$
$\gamma_{ea} = K_a \times \gamma_m = 29$ pcf (say 30 pcf)
* passive pressure case - $K_p = [1 + \sin(\phi')] / [1 - \sin(\phi')] = 4.2$
$\gamma_{ep} = K_p \times \gamma_m = 504$ pcf (say 330 pcf with a F.S. = 1.5)

			Thoroughly Compacted ⇒⇒	Uniformly Graded & Clean Coarse Sand or Sandy Gravel Fill	Non-Plastic Silty Sand or Sandy Silt Fill	
USE:	Earth Pressure Coefficient	Static Active	=	0.24	0.33	
		Static At-Rest	=	0.76	1.00	
		Static Passive	=	2.80	2.00	(with F.S. = 1.5)
		Static Passive	=	4.20	3.00	(with F.S. = 1.0)
USE:	Equivalent Fluid Pressure	Static Active	=	30 pcf		
		Static At-Rest	=	90 pcf (for rigid walls)		
		Static Passive	=	330 pcf (with F.S. = 1.5)	[500 pcf with (with F.S. = 1.0)]	

[For earthquakes, structural engineer may elect to use the above Static Passive case instead of the below Earthquake Lateral Load for Non-Yielding Wall movement into the soil backfill.]

USE: Simplified Model for Earthquake Lateral Load/Ft. Wall Length @ 0.6 H_{bw} above base. Loads for Non-Yielding Wall.
H_{bw} = Earth Height Behind Wall (feet)

Reduce load by 33% for Yielding Wall (active case) = (6.8 psf / foot) x H_{bw}^2 (NYS, S_{ds} = 0.25 g)
(γ_m = 120 pcf for S_{ds} value. Add to Static At Rest/ Active Pressure/Load for unsaturated backfill case) = (13.5 psf / foot) x H_{bw}^2 (NYS, S_{ds} = 0.50 g)
= (17.5 psf / foot) x H_{bw}^2 (NEern NYS, $S_{ds} \le 0.65$ g)

[Above for Site Class C to E soils. Interpolate for other S_{ds} values.
Use 1.75 x values for walls on Class B/A rock or on rigid foundation base. (FEMA NEHRP Guidelines)]

Saturated/Liquified Soil During Earthquake = 132 pcf
(Equivalent Fluid Pressure. Add to inertial hydrodynamic pressure, not presented here.)

{For looser/denser backfills, adjust above pressures by the ratio = new density / 120 pcf or / 132 pcf (for saturated case)}

USE:	Coefficient of Friction Against Sliding (f_s)	=	0.45	(on compacted NYSDOT Item #304.12 or #304.14 gravels)
	(use lowest f_s with no underlying weaker layers)	=	0.35	(on compacted granular soil & non-plastic silt)
		=	0.20	(slab-on-grade on polyethylene on granular fill)
	[with a F.S. = 1.0]	=	0.60/0.50	(on clean, rough, & sound bedrock/smooth bedrock)
	Min. Factor of Safety Against Sliding	=	1.5	*[Rev.9-30-09]*

BARRON & ASSOCIATES, P.C.
Geotechnical Consulting and Special Inspections
10440 Main Street
Clarence, NY 14031
(716) 759-7821
www.barronandassociatespc.com

APPENDIX E

GENERAL EARTHWORK SPECIFICATION

Barron & Associates, P.C.
GENERAL EARTHWORK SPECIFICATION

PART 1 GENERAL

1.1 SITE AND SUBSURFACE CONDITIONS

1.1.1 Overview

This specification is included as a courtesy to the clients of Barron & Associates, P.C, and addresses earthwork site preparation. Additions and modifications are necessary to create a job-specific specification. This specification may serve as a basis for the development for a technical specification under Division 2, *Site Work.*

1.1.2 Site Conditions

The site-specific conditions are described under separate cover or may be available from the OWNER.

1.1.3 Subsurface Conditions

The site-specific subsurface conditions are described under separate cover or may be available from the OWNER.

1.2 REFERENCES

American Standard for Testing and Measurement (ASTM):

ASTM C136	Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C2922	Density for Soil and Soil-Aggregate in Place by Nuclear Methods
ASTM D422	Test Method for Particle-Size Analysis of Soils
ASTM D1140	Amount of Material in Soils Finer Than the No. 200 Sieve
ASTM D1557	Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft^3)
ASTM D2216	Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock
ASTM D2487	1990 Classification of Soils for Engineering Purposes
ASTM D4318	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.3 DEFINITIONS

1.3.1 Unacceptable Material

Soil material containing debris, wood, scrap material, vegetation, refuse, soft unsound particles, and other organic, frozen, deleterious, or objectionable materials. Contaminated soils shall be properly documented and removed or remediated on site. If necessary, remediation procedure will be defined by the OWNER.

1.3.2 Unsuitable Material

Brown, organic topsoil and underlying soft pockets of organic silt or wet, reworked silty clay.

1.3.3 Ordinary Fill

Friable soil containing no stone greater than two-thirds loose lift thickness and no unacceptable or unsuitable materials. In general, existing random fill is expected to be acceptable for reuse as ordinary fill given proper sorting, blending, drying, and controlled placement methods.

1.3.4 Granular Fill

Ordinary fill meeting the designation of ASTM D2487 classification of GW with a maximum of 10 percent by weight passing ASTM D1140, No. 200 sieve.

1.3.5 Select Granular Fill

Clean, uncoated soil which contains no unacceptable materials and conforms to the gradation requirements defined in Table A: Select Granular Fill.

Table A: Select Granular Fill	
Sieve Size	Percent Finer by Weight
2/3 of the loose lift thickness	100
No. 10	30 - 95
No. 40	10 - 70
No. 200	0 - 15

1.3.6 Sand and Gravel

Clean, hard, durable, uncoated particle of sand and gravel, free from lumps of clay, containing no unacceptable matter, and conforming to gradation requirements of *Table B : Sand and Gravel*

Table B: Sand and Gravel	
Sieve	Percent Finer by Weight
*	100
No. 4	50 - 85
No. 10	--
No. 40	10 - 35
No. 100	--
No. 200	0 - 8

* Job-Specific. To be determined by the ENGINEER

1.3.7 Crushed Stone

Clean, durable, sharp-angled fragments of rock or crushed gravel stone of uniform quality, containing no unacceptable matter, free from coatings, and conforming to gradation requirements of *Table C: Crushed Stone*

Table C: Crushed Stone		
	Percent Passing	
Sieve Size	¾-inch Stone	1 ¼-inch Stone
1 ½-inch	__	100
1 ¼-inch	__	85-100
1- inch	100	__
¾-inch	90-100	10-40
5/8-inch	__	__
½-inch	10-50	0-8
3/8-inch	0-20	__
#4	0-5	__

1.3.8 Flowable Fill

Also known as Controlled Low Strength Material – Controlled Density Fill (CLSM-CDF), this material is available under a variety of producer names (e.g., K-Krete©, M-Crete, Flash Fill©, Flowable Mortar, Unshrinkable Fill, etc.). This non-settling backfill mixture is most commonly used for its flowable characteristics, its support strength under traffic loads, and its removability at a later date. The material may be produced on-site or off-site. In either case, the producer of such materials and the product must meet certain certification criteria. Such information is beyond the scope of this specification and will be considered on a site-specific basis.

Flowable fill may be acceptable for use as a backfill for utility trenches of other low-lying areas which require a compacted granular fill. Its use and warranty of performance is left to the CONTRACTOR in such applications.

The use of flowable fill under load-bearing structural components in place of properly placed and compacted granular fill is NOT common and is questionable. The localized use of such material may have profound affects on the performance of a foundation system. Site-specific conditions and the extent of anticipated use of flowable fill must be examined by geotechnical engineer. Cost of such consultation shall be borne by the CONTRACTOR unless specifically directed by the OWNER to seek such consultation. Without such consultation, warranty of performance for such use is left to the CONTRACTOR.

1.4 SUBMITTALS

The following submittals shall be provided in accordance with approved submittals procedures.

1. Fill Source: Provide name and source locations of fill material.

2. Field Test Reports: Field tests will be performed by OWNER's Representative as needed. CONTRACTOR may be required to perform such tests on proposed off-site fill materials.

a. Fill material grain size analyses per ASTM C136, D422, D1140, D2487
b. Moisture/Density test results per ASTM D2216
c. Liquid limit, plastic limit, and plasticity index per ASTM D4318
d. Compaction/Density test results per ASTM C2922 and D1557

3. Sample: Geotextile fabric

PART 2 PRODUCTS

Geotextile Fabric: Mirafi 600X or equal. (Also referred to as synthetic fabric).

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 General

Manner of excavation shall minimize disturbance of underlying natural ground. If deemed necessary by the Engineer, alter construction procedures to reduce subgrade disturbance. Excavate areas which have been excessively disturbed to firm ground and backfill with properly compacted granular fill.

3.1.2 Roads and Walks

Keep roads and walks free of dirt and debris at all times.

3.1.3 Trees, Shrubs, and Existing Facilities

Protect from any damage all vegetation and facilities identified to remain.

3.1.4 Utility Lines

Locate all utilities within the area of disturbance prior to the start of work. Show locations on initial plans. Protect utility lines from damage. Notify the ENGINEER immediately of damage to or an encounter with an unknown utility. Damage to utility lines are to be repaired by the CONTRACTOR at no additional cost. The CONTRACTOR shall have underground utility owners stake out utility locations prior to the start of clearing and excavation operations.

3.2 VERIFICATION OF CONDITIONS/PROOF-ROLLING

Prior to placement of the initial layer of fill over the natural ground, proof-roll the exposed natural ground above the groundwater table elevation by making two passes with a fully-loaded ten-wheel truck. Excavate unstable areas detected by this process and replace with compacted granular fill.

3.3 PREPARATION

3.3.1 Surface Preparation

Within the site limits indicated on the drawings, excavate all unsuitable material to firm natural ground in the manner specified herein. Follow a construction procedure which permits visual identification of firm natural ground. In the even that groundwater is encountered, the ENGINEER may require that the size of the open excavation be limited to that which can be handled by open pumping to allow visual inspection of the excavation bottom and the performance of backfill operations to be conducted in a dry state.

Excavation of unsuitable material shall be limited to the greater of the following:

- A distance of 5 feet beyond building lines or
- The area defined by a one-horizontal to one-vertical line sloping down from the outside bottom edge of exterior footings to firm natural ground.

3.4 PLACEMENT AND COMPACTION

3.4.1 General

Place fill in accordance with *Table D: Compaction Alternatives.* These alternatives are provided as minimum compaction
standards only and in no way relieve the CONTRACTOR of his obligation to achieve any specified degree of compaction by whatever means may be necessary.

Grade to provide positive drainage and a smooth surface which will readily shed water. To the extent practicable, compact each layer to the specified density on the same day placed. Place fill in horizontal layers. Where horizontal layers meet a natural slope, key layer into slope by cutting a bench.

Fill that is too wet for proper compaction: Disc, harrow, or otherwise dry to proper moisture content for compaction to the required density.

Fill that is too dry for proper compaction: Uniformly apply water over the surface of the loose layer in sufficient quantity to allow compaction to the required density.

Table D: Compaction Alternatives					
Compaction Method	Max. Stone Size	Maximum Loose Lift Thickness (inches)		Maximum Number of Passes	
		Below Structure and Pavements	Less Critical Areas	Below Structure and Pavements	Less Critical Areas
Hand operated vibratory plate of light roller in confined areas	3	4	4	4	4
Hand operated vibratory drum rollers weighing at least 1,000 pounds in confined areas	4	6	8	4	4
Loaded 10-wheel truck or D-8 crawler	6	10	12	4	2
Light vibratory drum roller; Min. weight at drum 8,000lbs; Min. dynamic force 10,000lbs.	8	12	12	6	2
Minimum vibratory drum; Min. weight at drum 10,000lbs; Min. dynamic force 20,000lbs.	8	18	18	6	4

3.4.2 Dewatering

Provide adequate pumping and drainage facilities to keep excavated areas sufficiently dry of groundwater and surface run-off. Dewatering shall avoid adversely affection construction procedures or causing excessive disturbance of underlying natural ground. Drain all pumped water in such a manner as to avoid damage to adjacent property.

If requested by the ENGINEER, place a 6-inch to 12-inch layer of sand and gravel or crushed stone over the natural underlying soil to stabilize area which have been disturbed due to groundwater seepage pressures and to expedite dewatering operations. Particular attention shall be given areas under proposed foundations.

3.5 FIELD QUALITY CONTROL

3.5.1 Compaction Requirements

Allow the ENGINEER sufficient time to make necessary observations and tests. Base the degree of compaction on maximum dry density as determined by ASTM D1557. The minimum degree of compaction for placed fill shall be as indicated *in Table E: Compaction Requirements.*

Table E: Compaction Requirements	
Area	Minimum Degree of Compaction (%)
Below foundation	95
Pavement and building subbase and base courses	95
Below building slab base course and above bottom of foundation	92
Below pavement subbase and base courses	90
Trench backfill outside of building	90
Trench backfill inside of building	Refer to one of the above-listed categories
Ordinary fill within 5 feet of grade	90
Vegetated areas below 5 feet of grade	85

3.5.2 Testing

Site work should be monitored and tested by geotechnical ENGINEER or his representative and in accordance with requirements of the design team to assure compliance with earthwork and foundation construction specifications.

The owner will retain a geotechnical ENGINEER or his representative to perform on-site observations and testing during this phase of construction operations. The geotechnical ENGINEER or his representative will:

- Observe excavation and dewatering of building and controlled fill areas;
- Observe backfill and compaction within building and controlled fill areas;
- Laboratory test and analyze fill material; and
- Observe construction – and performing water content, gradation, and compaction tests.

On a timely basis, the CONTRACTOR will receive copies of test results submitted to the OWNER. In addition, during construction the geotechnical ENGINEER will advise the OWNER and CONTRACTOR in writing of conditions which fail to conform to the Contract Documents. The CONTRACTOR shall take immediate action to remedy indicated deficiencies.

The geotechnical ENGINEER or his representative will not supervise or direct the actual work of the CONTRACTOR or employees and representatives of the CONTRACTOR. The presence of, observations by, and testing performed by the geotechnical ENGINEER or his representatives shall not excuse the CONTRACTOR from defects discovered in the work.

BARRON & ASSOCIATES, P.C.
Geotechnical Consulting and Special Inspections
10440 Main Street
Clarence, NY 14031
(716) 759-7821
www.barronandassociatespc.com

APPENDIX F

LIMITATIONS

LIMITATIONS

1. This report is based on the data that was obtained from the subsurface explorations and on the design of the proposed pump station addition as submitted to the geotechnical engineer. A geotechnical engineer, who is experienced in foundation construction and earthwork, should be engaged to review the final design and specifications in order to determine whether any change in concept may have any effect on the validity of the conclusions presented herein, and whether these conclusions have, in fact, been implemented in the design and specifications.

2. The subsurface conditions, including thickness, between the exploration locations are approximate and simplified representations of the strata and transitions. There is the possibility that variations in soil and rock conditions and boundaries will be encountered during construction. In order to permit correlation between the exploratory soil data and the actual soil conditions encountered during construction and so as to assess conformance with the plans and specifications as originally contemplated, it is recommended that a geotechnical engineer, who is experienced in foundation construction and earthwork monitoring, should be retained to perform continuous construction review during the site preparation and foundation construction operations.

3. The subsurface exploration logs and subsurface conditions may aid in estimating material quality and quantities, such as topsoil/organic matter, fills, natural soils, and rock, but are not to be relied upon as the exclusive means for bid preparation purposes. It is the responsibility of the contractor to perform any additional site examinations and explorations and to prepare an accurate bid.

4. Disclaimers:

   a. In the event that any changes in the nature, design or location of the structure are planned, the conclusions that are contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report are modified or verified in writing.

   b. The geotechnical engineering report has been prepared for this project by Barron & Associates, P.C. This report is for assistance in design only and is not a sufficient basis on which to prepare an accurate bid.

   c. This report has been prepared for the exclusive use of GHD Consulting Services, Inc. of Buffalo, New York, their client(s) and their designated design representatives, for specific application to the construction of an addition to the existing Erie County Water Authority Guenther Pump Station at 3478 Pleasant Avenue, in the Town of Hamburg, Erie County, New York and in accordance with generally accepted geotechnical engineering practice. No other warranty, expressed or implied, is made.

Appendix F
Pump Station VFD Control Panel Drawings

480 VAC
3 PHASE
60 HZ

L1
L2
L3
CB1
MAIN CB

1L1
1L2
1L3

SCHNEIDER ELECTRIC ALTIVAR 660 - 700HP AC MOTOR AJUSTABLE SPEED DRIVE CONTROLLER

IC1
5/L3 3/L2 1/L1
6/T3 4/T2 2/T1

2L3 2L2 2L1

LR1
A1 B1 C1
A2 B2 C2

ENERGIZED W/ NO FAULT
R1A
R1B
R1C
I12
TO PLC INPUT %I0.12 (SHEET 2)
1104
DRIVE IN RUN
R2A
R2C
I13
TO PLC INPUT %I0.13 (SHEET 2)
1104
(3137) CONTACTOR RELAY
1104 R5 1113
A2 A1
CONTACTOR CONTROL
R3A
R3C

P24 EXTERNAL POWER SUPPLY TERMINAL (+24)
0V EXTERNAL POWER SUPPLY TERMINAL (COM)
DI1 RUN
DI2 NOT ASSIGNED
DI3 NOT ASSIGNED
DI4 FAULT RESET
DI5 DRIVE LOCK
DI6 NOT ASSIGNED
+24 INTERNAL SUPPLY

1103 1103
1104 MCR %Q0.14 1104
1103 23 24 3131 Q14 1103 Q14
%Q0.1 FAULT RESET
1103 MCR DRIVE LOCK Q1
1103 33 34 1111

LCD GRAPHIC KEYPAD VW3A1111

GRAPHIC DISPLAY TERMINAL RJ45
MODBUS EMBEDDED RJ45
ETHERNET EMBEDDED RJ45

R/L1 S/L2 T/L3 GND
3L1 3L2 3L3
GND U/T1 V/T2 W/T3
1T1 1T2 1T3

3L3 3L2 3L1

MOTOR
YEL 3T3 3T3 6/T3 5/L3 IC2 6/T3 5/L3 2T3 1T3
ORG 3T2 3T2 4/T2 3/L2 4/T2 3/L2 2T2 1T2
BRN 3T1 3T1 2/T1 1/L1 2/T1 1/L1 2T1 1T1
MOL

1103 1104

FU1 LP-CC-6
FU2 LP-CC-6
H1 H3 H2 H4
CPT1
1500VA
X1 X3 X2 X4
120 VAC
FU3 LP-CC-15
CPN
CPL1

5 3 1
L G N
TVSS
11 1104
12 2113
L G N
6 4 2
TO PLC INPUT %I0.11 (SHEET 2)

1100 1100 1102 1102
N
EMERGENCY STOP
1100 PB1 1130 JUMPER 1131 JUMPER 1132 1132 A1 MCR A2 1102
(1108)
(1135)
(1110)
(2102)

MCR
13 14 1133
1133

MODICON PLC
TM221CE40R
ETHERNET
LINE NEUT GND +24 V0
TM3TI4 +24 V0
1104 1104

1103 FU11 S504-100MA FU11
1103 FU4 S505-2A FU4
FU5 S505-2A FU5
L 120VAC N
PHOENIX CONTACT
MINI-PS-100-240AC/24DC/4
+ 24VDC-4A -
1103 FU10 S505-4A FU10 1104

PROFACE
PFXGP4301TADW
HMI
ETHERNET
RJ45
24VDC
(+) (-) G

1103 FU13 S505-1A FU13 1104

PHEONIX ETHERNET
FL SWITCH SFN 8TX
2891002
RJ45 RJ45 RJ45 RJ45
RJ45 RJ45 RJ45 RJ45
24VDC
(+) (-) G

1103 FU14 S505-1A FU14 1104

RTU
FRONT DOOR BULKHEAD

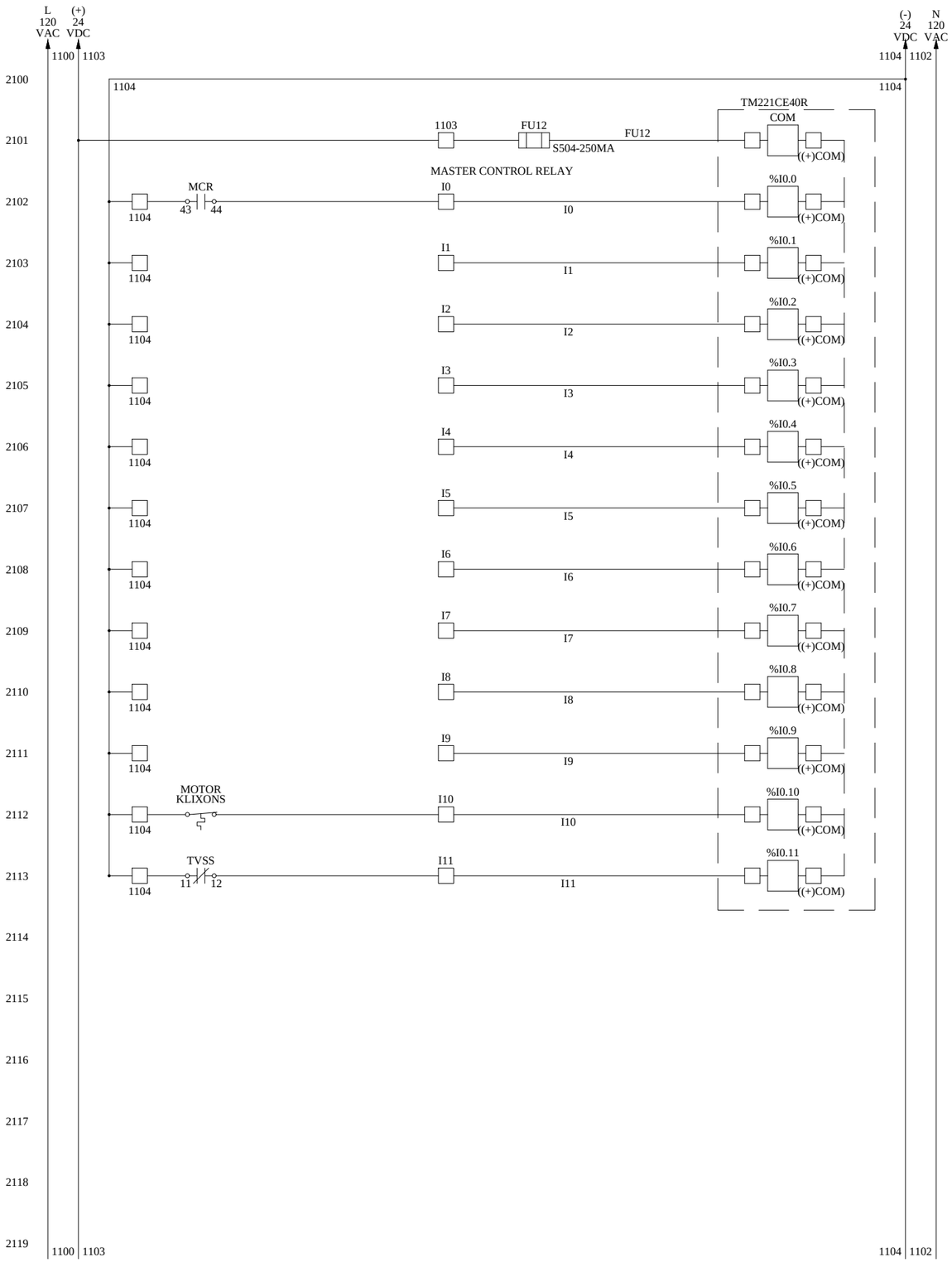
1100 1103 1133

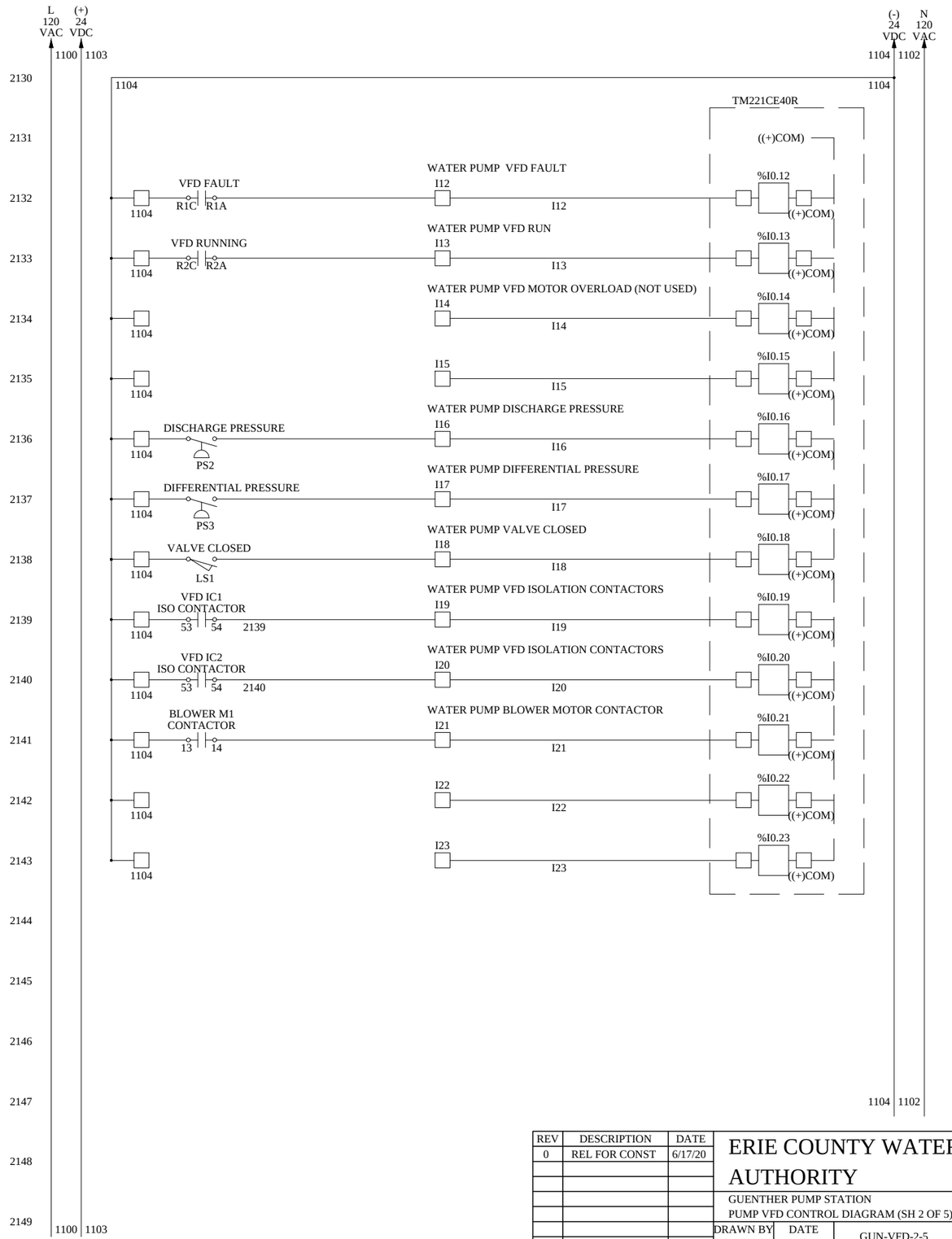
REV	DESCRIPTION	DATE
0	REL FOR CONST	6/17/20

ERIE COUNTY WATER AUTHORITY

GUENTHER PUMP STATION
PUMP VFD CONTROL DIAGRAM (SH 1 OF 5)

DRAWN BY	DATE		REV
S. AIPLE	6/17/20	GUN-VFD-1-5	00





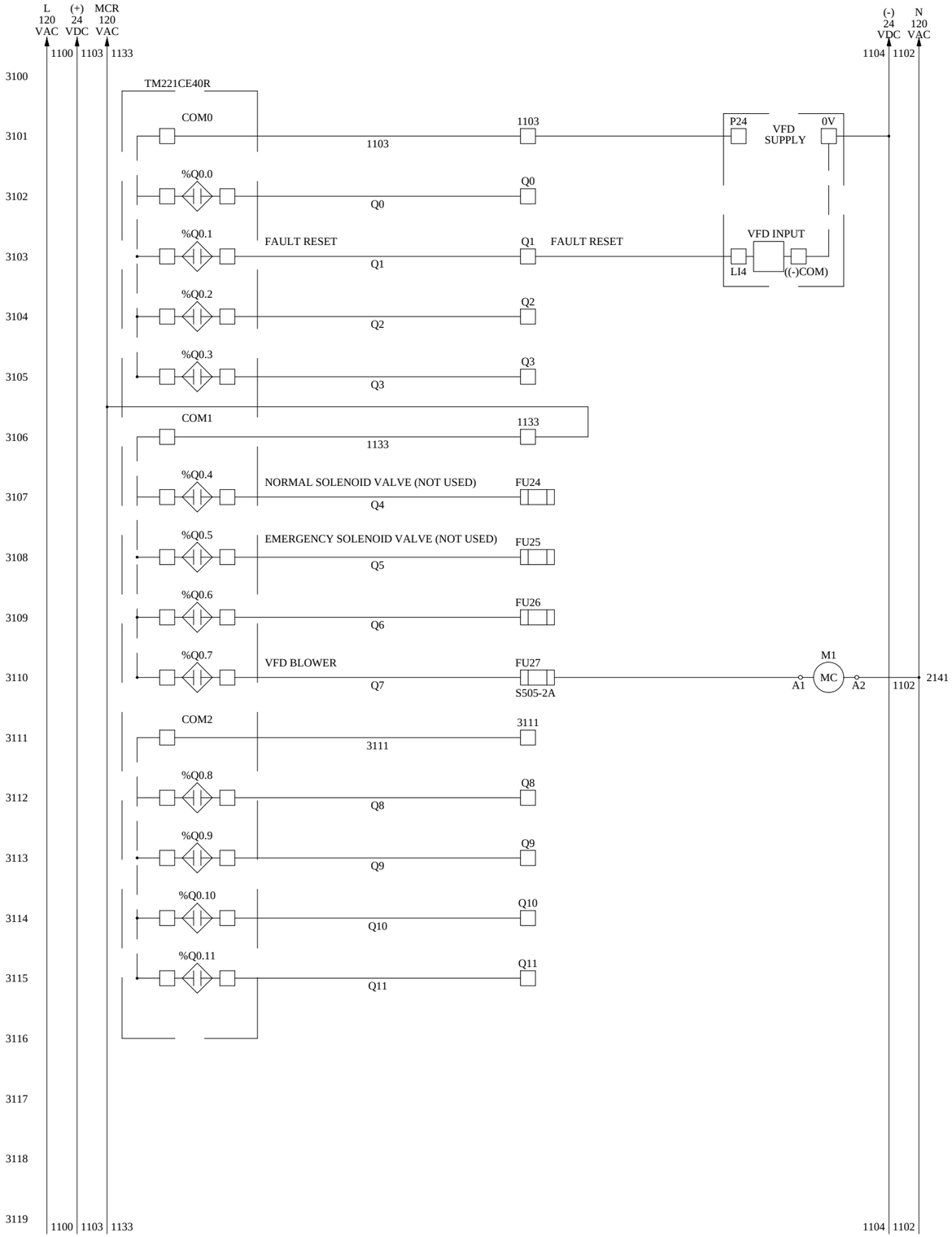
REV	DESCRIPTION	DATE
0	REL FOR CONST	6/17/20

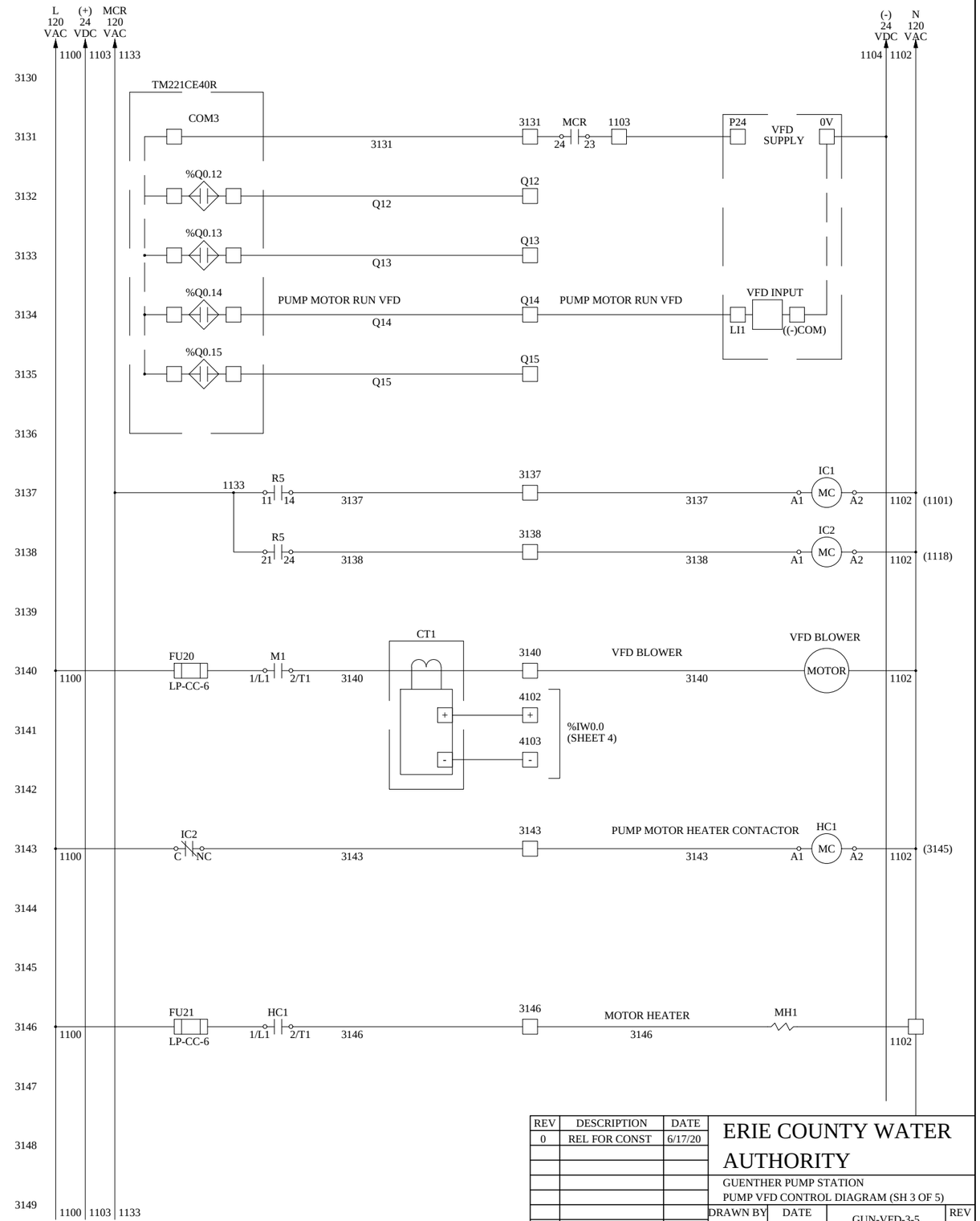
ERIE COUNTY WATER AUTHORITY

GUENTHER PUMP STATION

PUMP VFD CONTROL DIAGRAM (SH 2 OF 5)

DRAWN BY	DATE		REV
S. AIPLE	6/17/20	GUN-VFD-2-5	00



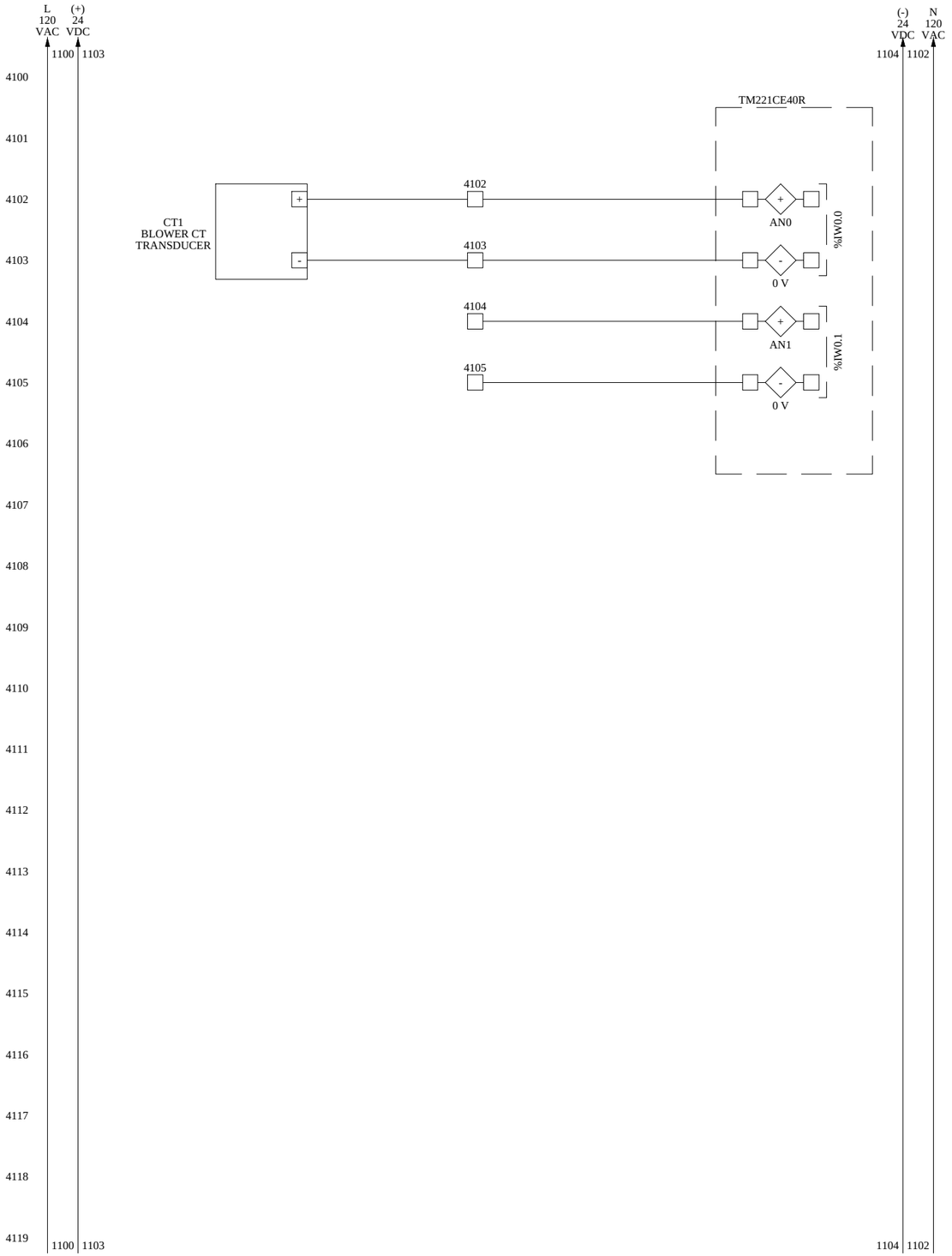


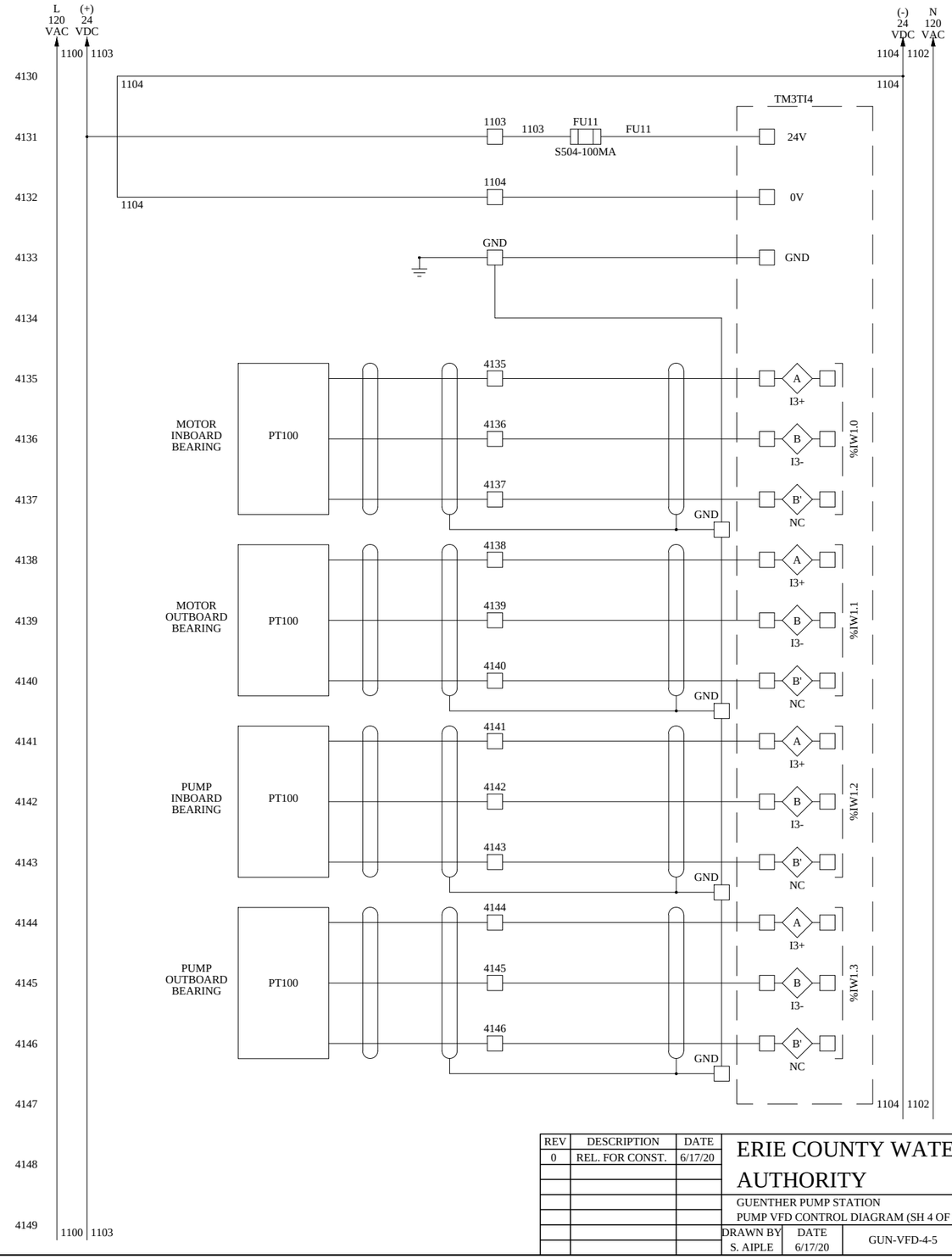
REV	DESCRIPTION	DATE
0	REL FOR CONST	6/17/20

ERIE COUNTY WATER AUTHORITY

GUENTHER PUMP STATION
PUMP VFD CONTROL DIAGRAM (SH 3 OF 5)

DRAWN BY	DATE		REV
S. AIPLE	6/17/20	GUN-VFD-3-5	00





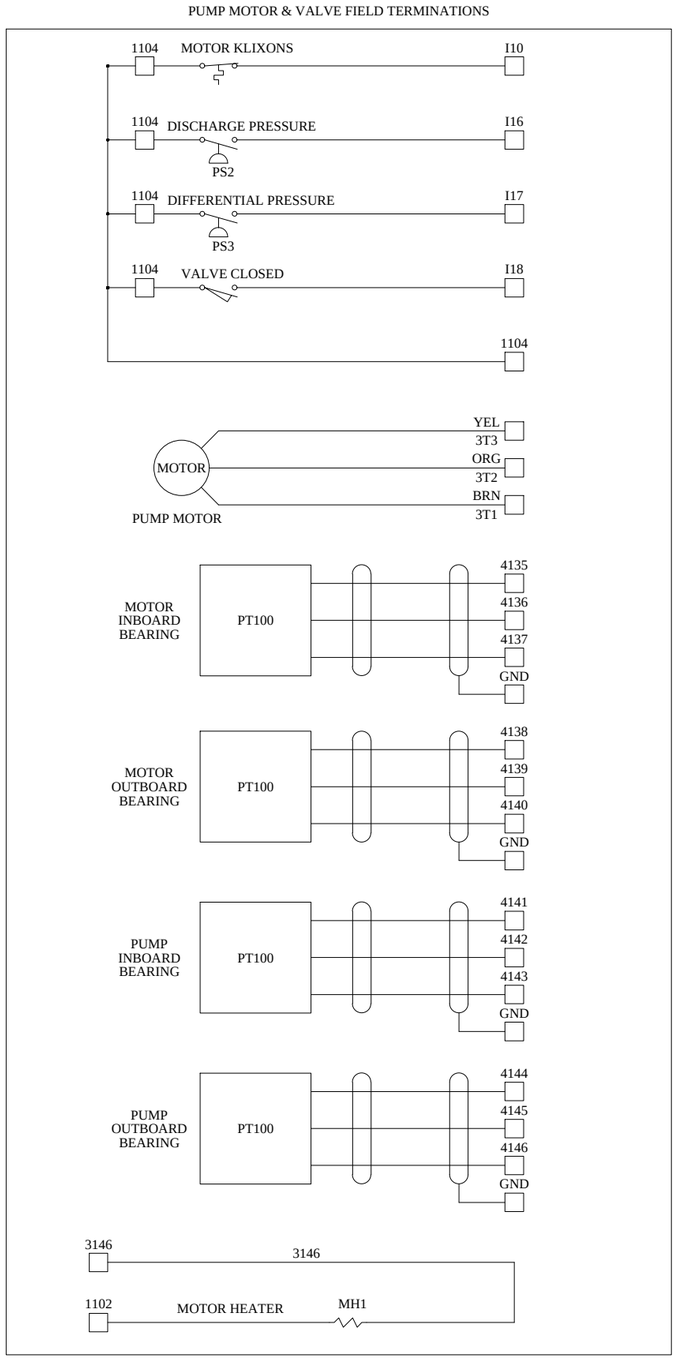
REV	DESCRIPTION	DATE
0	REL. FOR CONST.	6/17/20

ERIE COUNTY WATER AUTHORITY

GUENTHER PUMP STATION
PUMP VFD CONTROL DIAGRAM (SH 4 OF 5)

DRAWN BY	DATE		REV
S. AIPLE	6/17/20	GUN-VFD-4-5	00

PUMP MOTOR & VALVE FIELD TERMINATIONS



REQ	QUANTITY	U/M	MANUFACTURER	DESCRIPTION	PART NUMBER	DEVICE
	1	EA	SCHNEIDER ELECTRIC	ALTIVAR 660 VFD - 700HP	ATV660...	VFD
	1	EA	SCHNEIDER ELECTRIC	VFD GRAPHIC KEYPAD	VW3A1111	VFD
	1	EA	SCHNEIDER ELECTRIC	VFD GRAPHIC KEYPAD DOOR MOUNTING KIT	VW3A1112	VFD
	1	EA	SCHNEIDER ELECTRIC	VFD GRAPHIC KEYPAD - 3 METER CABLE	VW3A1104R30	VFD
	1	EA	SCHNEIDER ELECTRIC	CIRCUIT BREAKER	PLL36100	CB1
	2	EA	SCHNEIDER ELECTRIC	CONTACTOR	LC1F800	IC1, IC2
	2	EA	SCHNEIDER ELECTRIC	TERMINAL COVERS	LA9F704	IC1, IC2
	2	EA	SCHNEIDER ELECTRIC	CONTACT COIL SUPRESSOR	LA9D09980	IC1, IC2
	2	EA	SCHNEIDER ELECTRIC	CONTACT COIL SUPRESSOR MOUNTING BRACKET	LA9D09981	IC1, IC2
	2	EA	SCHNEIDER ELECTRIC	AUX 1NO-1NC CONTACTS	LADN11	IC1, IC2
	1	EA	SCHNEIDER ELECTRIC	CONTROL RELAY	CAD50G7	MCR
	2	EA	SCHNEIDER ELECTRIC	CONTACTOR	LC1D12G7	M1, HC1
	2	EA	SCHNEIDER ELECTRIC	CONTACT COIL SUPRESSOR	LAD4RCU	M1, HC1
	1	EA	SCHNEIDER ELECTRIC	E-STOP PUSH BUTTON	XB4BT842	E-STOP
	1	EA	SCHNEIDER ELECTRIC	E-STOP PUSH BUTTON GUARD	ZB4BZ1905	E-STOP
X	1	EA	SCHNEIDER ELECTRIC	M211 40 I/O PLC	TM221CE40R	PLC
X	1	EA	SCHNEIDER ELECTRIC	4 CHANNEL TEMPERATURE INPUT MODULE	TM3TI4	PLC
	1	EA	SCHNEIDER ELECTRIC	CONTROL TRANSFORMER	9070TF1500D1	CPT1
	1	EA	SCHNEIDER ELECTRIC	FUSE PULLER KIT	9070FP1	CPT1
	1	EA	SCHNEIDER ELECTRIC	FINGER SAFE KIT	9070FSC2	CPT1
	1	EA	BUSSMAN	TYPE CC FUSE - 15A	LP-CC-15	FU3 (CPT1)
	3	EA	BUSSMAN	TYPE CC FUSE - 6A	LP-CC-6	FU1, FU2, FU20, FU21
	1	EA	BUSSMAN	5 X 20 TYPE T FUSE - 100MA	S504-100MA	FU11
	1	EA	BUSSMAN	5 X 20 TYPE T FUSE - 250MA	S504-250MA	FU12
	2	EA	BUSSMAN	5 X 20 TYPE T FUSE - 1A	S505-1A	FU13, FU14
	4	EA	BUSSMAN	5 X 20 TYPE T FUSE - 2A	S505-2A	FU4, FU5, FU26, FU27
	1	EA	BUSSMAN	5 X 20 TYPE T FUSE - 4A	S505-4A	FU10
	2	EA	BUSSMAN	TYPE CC FUSE HOLDER	CHCC1DIU	FU20, FU21
	1	EA	PHOENIX CONTACT	TVSS BASE	2905557	TVSS
	1	EA	PHOENIX CONTACT	TVSS MODULE	2905234	TVSS
	5	EA	PHOENIX CONTACT	24VDC 5 X 20 FUSE HOLDER UK5-HESILED24	3004126	FU10, FU11, FU12, FU13, FU14
	4	EA	PHOENIX CONTACT	250VAC 5 X 20 FUSE HOLDER UK5-HESILA250	3004142	FU4, FU5, FU26, FU27
	AS REQ.	EA	PHOENIX CONTACT	BLUE TERMINAL BLOCK - UT 4 BU	3044115	TERMINAL BLOCKS
	AS REQ.	EA	PHOENIX CONTACT	GREY TERMINAL BLOCK - UT 4	3044102	TERMINAL BLOCKS
	AS REQ.	EA	PHOENIX CONTACT	END COVER - D-UT 2,5/10	3047028	TERMINAL BLOCKS
	AS REQ.	EA	PHOENIX CONTACT	BLUE DOUBLE HIGH TERMINAL BLOCK - UTTB 4 BU	3044791	TERMINAL BLOCKS
	AS REQ.	EA	PHOENIX CONTACT	END COVER FOR DOUBLE HIGH TERMINAL - D-UTTB 2,5/4	3047293	TERMINAL BLOCKS
	AS REQ.	EA	PHOENIX CONTACT	GROUND BLOCK - UT 4-PE	3044128	TERMINAL BLOCKS
	AS REQ.	EA	PHOENIX CONTACT	END CLAMP - E/NS 35 N	0800886	TERMINAL BLOCKS
	AS REQ.	EA	PHOENIX CONTACT	PLUG-IN BRIDGE - FBS10-6	3030271	TERMINAL BLOCKS
	AS REQ.	EA	PHOENIX CONTACT	PLUG-IN BRIDGE - FBS20-6 BU	3032208	TERMINAL BLOCKS
	AS REQ.	EA	PHOENIX CONTACT	INSERTION BRIDGE - EBS 10-8	3118135	TERMINAL BLOCKS
	AS REQ.	EA	PHOENIX CONTACT	DIN RAIL - NS 35/15 PERF 1000MM	1207658	TERMINAL BLOCKS
	1	EA	PHOENIX CONTACT	POWER SUPPLY 24VDC 4A	2938837	POWER SUPPLY
X	1	EA	PHOENIX CONTACT	ETHERNET SWITCH	2891002	ETHERNET SWITCH
	1	EA	SCHNEIDER ELECTRIC	RELAY BASE - 3 POLE	RXZE2S111M	R5
	1	EA	SCHNEIDER ELECTRIC	RELAY MODULE - 3 POLE - 24VDC COIL	RXM3AB2BD	R5
	1	EA	WOODHEAD	ETHERNET BULKHEAD CONNECTOR	1300550001	ENCLOSURE
	1	EA	WOODHEAD	ETHERNET BULKHEAD CONNECTOR COVER	1300580035	ENCLOSURE
X	1	EA	SCHNEIDER ELECTRIC	PROFACE HMI	PFXGP4301TADW	HMI
	1	EA	KOOLTRONIC	BLOWER ASSEMBLY	KP4R355/127	BLOWER
	AS REQ.	EA	NVENT/HOFFMAN	FILTER GRILL PANEL (19"W X 10.5"H)	105G19	FILTER
	1	EA	EATON	CURRENT TRANSDUCER	EAC110SP	CT1
	1	EA	TCI	LINE REACTOR	KDRS2H	LINE REACTOR (700HP)

NOTE 1: BILL OF MATERIAL IS BASED ON ECWA STANDARD DESIGN, WHERE A SURFACE MOUNT VFD IS INSTALLED IN AN ECWA DESIGNED ENCLOSURE / COOLING PACKAGE. SINCE A 700HP DRIVE MUST BE PURCHASED AS PART OF A SCHNEIDER ELECTRIC DESIGNED ENCLOSURE / COOLING PACKAGE, MATERIALS MAY BE SUBSTITUTED WITH STANDARD SCHNEIDER ELECTRIC MATERIALS WITH THE EXCEPTION OF THOSE DEVICES DESIGNATED AS REQUIRED (REQ) WITH AN "X".

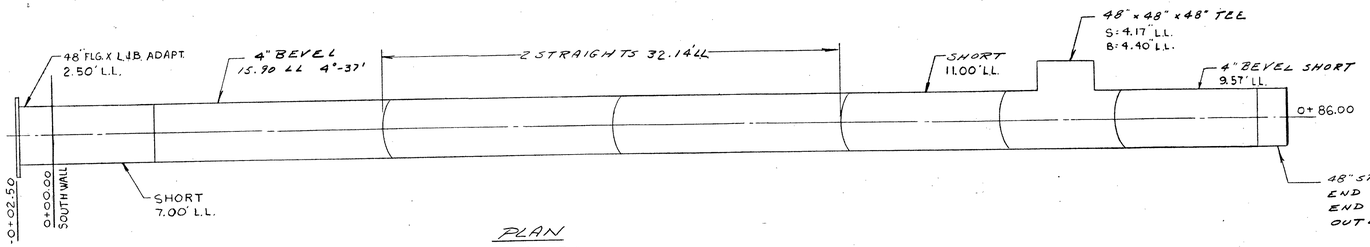
REV	DESCRIPTION	DATE
0	REL FOR CONST	6/17/20

ERIE COUNTY WATER AUTHORITY

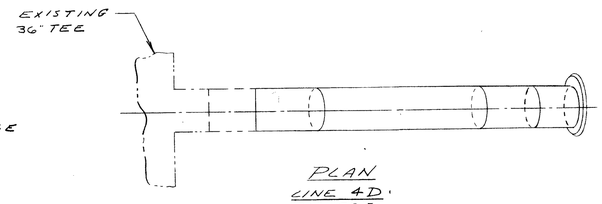
GUENTHER PUMP STATION
PUMP VFD CONTROL DIAGRAM (SH 5 OF 5)

DRAWN BY	DATE		REV
S. AIPLE	6/17/20	GUN-VFD-5-5	00

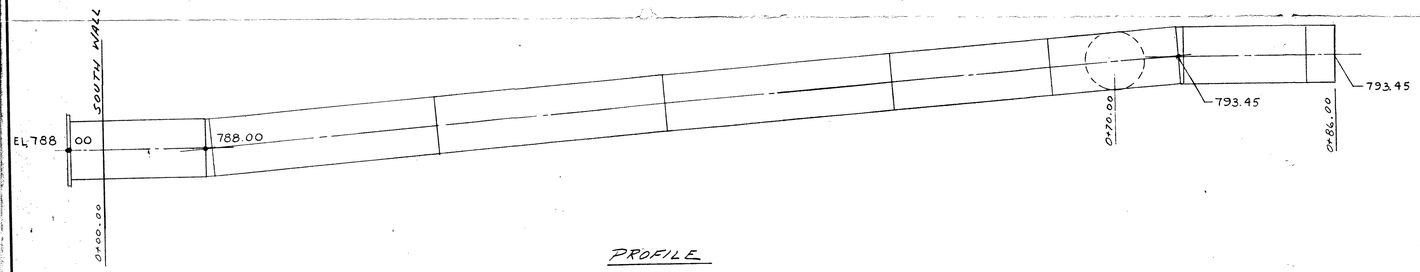
Appendix G
Pump Station Inlet and Outlet PCCP As-Built Information



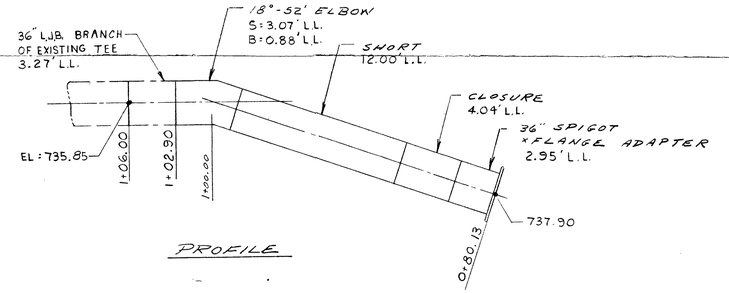
PLAN
LINE 13A
48" SP-5



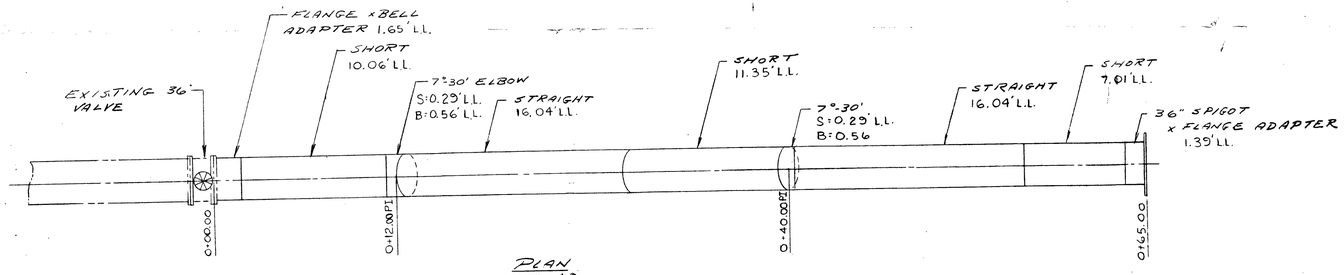
PLAN
LINE 4D
36" SP-5



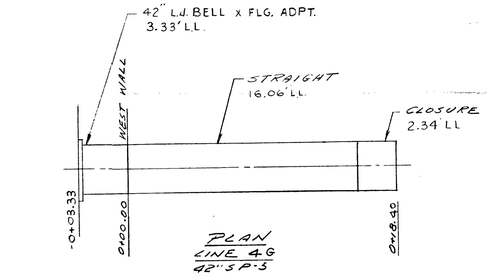
PROFILE



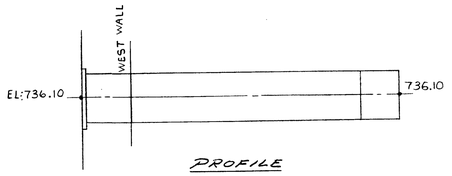
PROFILE



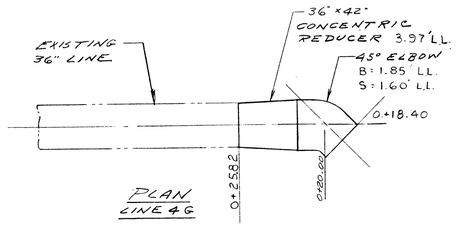
PLAN
LINE 4D
36" SP-5



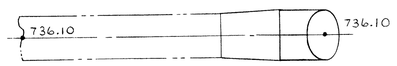
PLAN
LINE 4G
42" SP-5



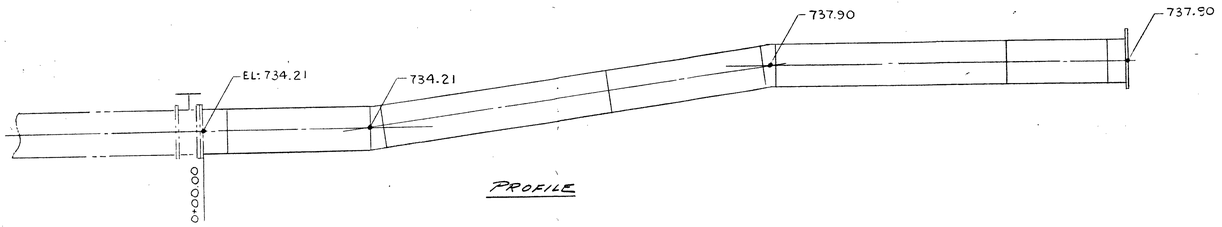
PROFILE



PLAN
LINE 4G



PROFILE

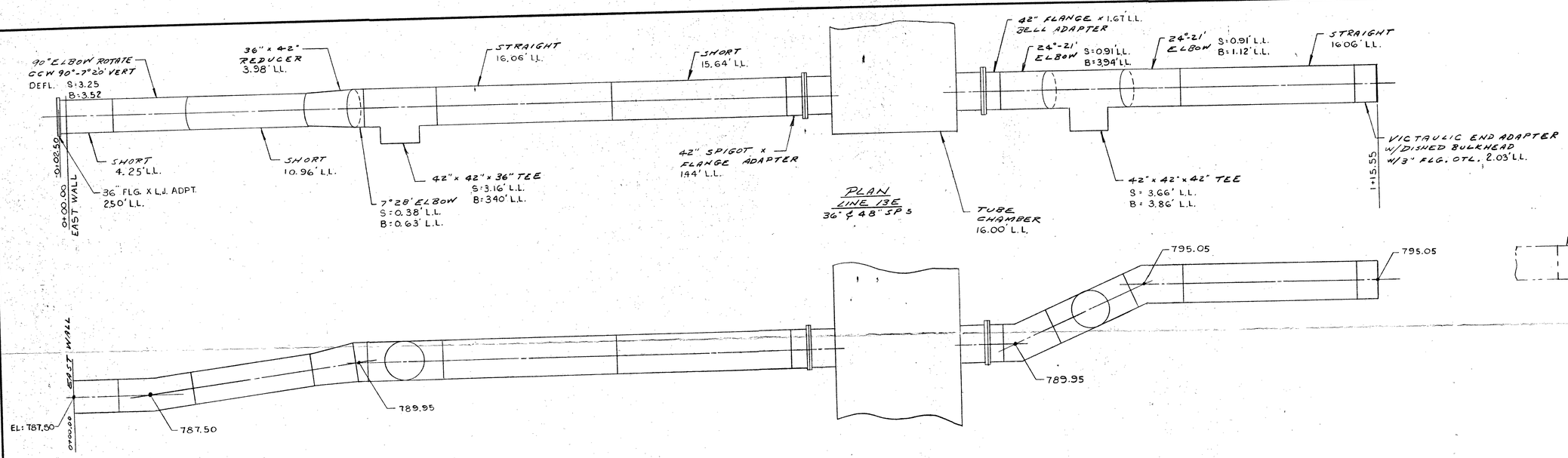


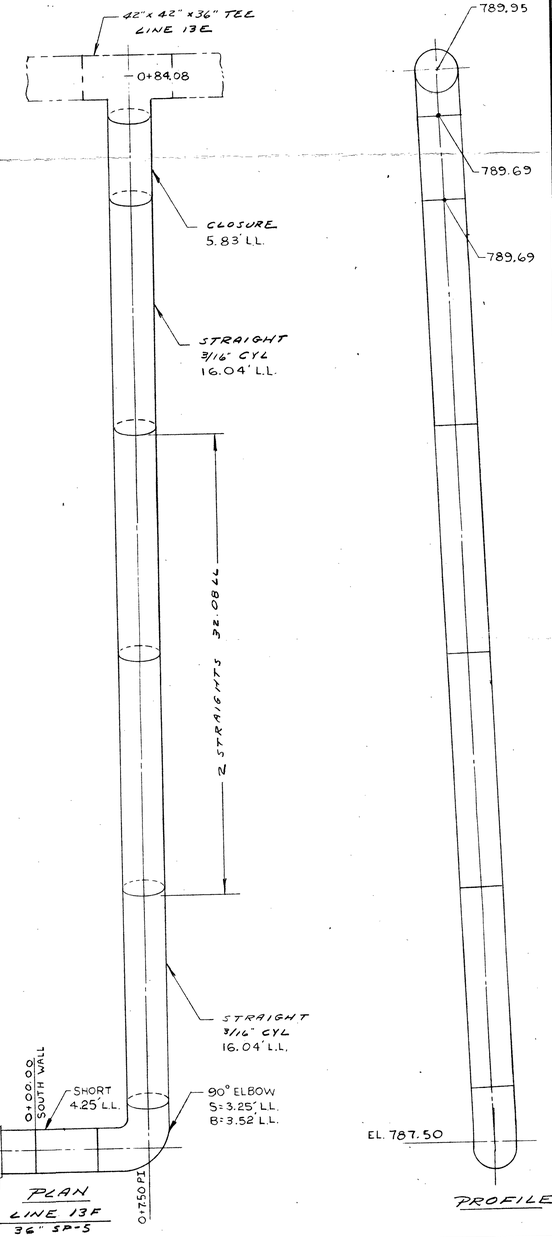
PROFILE

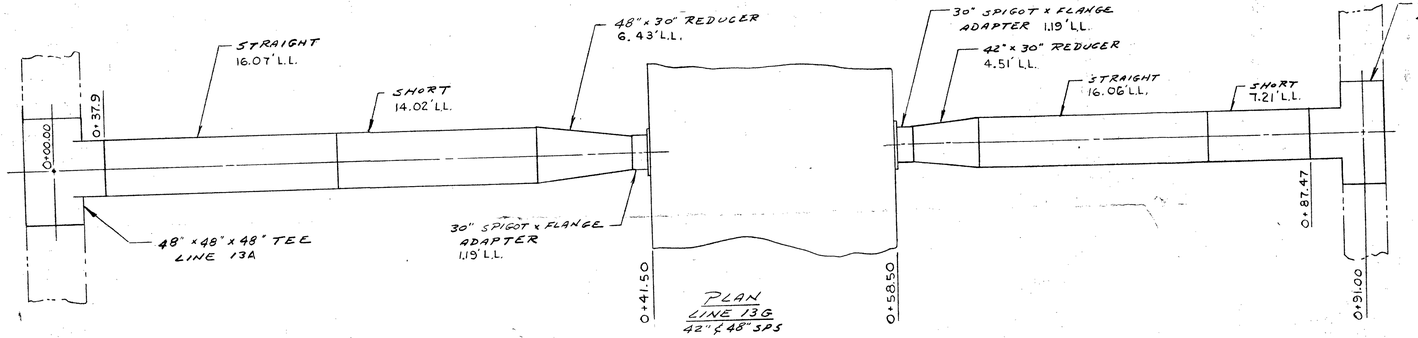
PRINTED
SEP 28 1971
W. T. C.

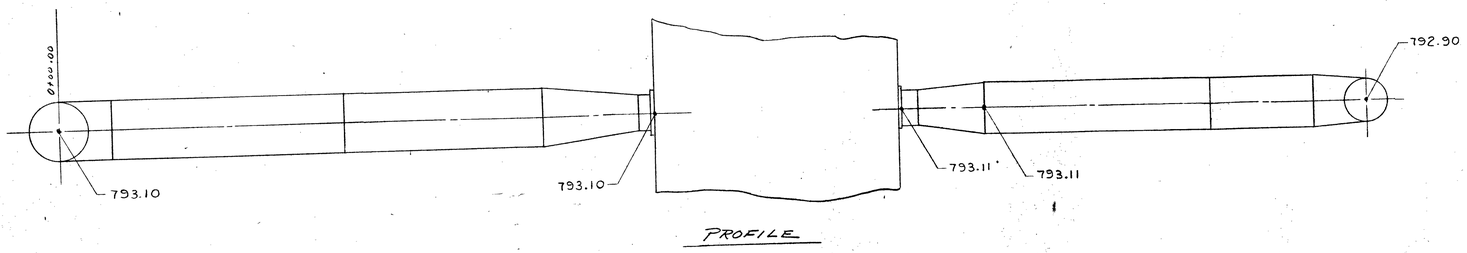
PLEASANT PUMPING STATION LAYOUT DRAWING : LINE NO. 13A WINDOM PUMPING STATION LAYOUT DRAWING : LINE NO. 4D & 4G	INTERPACE CORPORATION
SCALE: 1"=5'	DRAWING NUMBER: SS-WH-69-24-1 SHEET 7 OF 9 — REV.
DR. RMC 9-13-71 APP.	
CH. APP.	

REV.	DESCRIPTION	NEXT ASSEMBLY	QTY.









PRINTED
SEP 28 1971
W. T. C.

REV.	DESCRIPTION	NEXT ASSEMBLY	QTY.

DR. RAC	9-13-71	APP.	
CH.		APP.	

PLEASANT PUMPING STATION
LAYOUT DRAWING
LINES 13E, 13F, & 13G

SCALE: 1"=5'

INTERPACE CORPORATION

DRAWING NUMBER: SS-WH-69-24-1 SHEET 8 OF 9

REV.

PIPE SUMMARY

ERIE COUNTY, NEW YORK
PLEASANT PUMPING STATION & TANK
AND MODIFICATION AT WINDOM PUMPING STATION
48" SP-5
JOB NO. WH-69-24

INTERPACE CORPORATION
LOCK JOINT PIPE PRODUCTS

DATE: 9-11-69 BY: RHN:mh SHEET: 11

LINE REFERENCE 13A

DESCRIPTION	AVG LL	UNITS	TOT LL
STRAIGHTS:			
FLEX TIED WELDED AT EACH END & W/12 GA. CYL.	16.07	2	32.14
SHORTS:			
(7.25' OA) FLEX TIED WELDED AT EACH END & W/12 GA. CYL.	7.00	1	7.00
(11.25' OA) FLEX TIED WELDED AT EACH END & W/10 GA. CYL.	11.00	1	11.00
4" BEVEL SHORT (9.99' OA) FLEX TIED WELDED AT EACH END & W/10 GA. CYL.	9.57	1	9.57
4" BEVELS:			
FLEX TIED WELDED AT EACH END & W/12 GA. CYL.	15.90	1	15.90
ADAPTERS:			
48" LJ SPIGOT x VICTAULIC END (2.29' OA) FLEX TIED WELDED AT LJ SPIGOT END	2.04	1	2.04
48" FLANGE x LJ BELL WALL FITTING (2.50' OA) FLEX TIED WELDED AT LJ BELL	2.50	1	2.50
TEES:			
48" LJ SPIGOT x 48" LJ BELL x 48" LJ BELL (8.82' OA ON RUN) (BRANCH LL = 3.79') FLEX TIED WELDED AT EACH END (3/8" x 5" BELL ON BRANCH)	8.57	1	8.57
48" VICTAULIC END DISHED BULKHEAD W/3" FLANGE OUTLET	0.00	1	0.00
	TOTAL	10	88.72

PIPE SUMMARY

INTERPACE CORPORATION
LOCK JOINT PIPE PRODUCTS

ERIE COUNTY, NEW YORK
PLEASANT PUMPING STATION & TANK
AND MODIFICATION AT WINDOM PUMPING STATION
36" & 42" SP-5
OUR JOB NO. WH-69-24

DATE: 9-12-69 BY: RHN:mh SHEET: 12

DESCRIPTION	LINE REFERENCE 13E	AVG LL	UNITS	TOT LL
36" SP-5				
SHORTS:				
(4.49' OA)	FLEX TIED WELDED AT EACH END & W/3/16" CYL (3/8" x 5" BELL)	4.25	1	4.25
(11.20' OA)	FLEX TIED WELDED AT EACH END & W/3/16" CYL (3/8" x 5" BELL)	10.96	1	10.96
ELBOW:				
90°-00'	FLEX TIED WELDED AT EACH END (3/8" x 5" BELL)	6.77	1	6.77
36" FLANGE x LJ BELL WALL FITTING (2.50' OA)	FLEX TIED WELDED AT LJ BELL (3/8" x 5" BELL)	2.50	1	2.50
		TOTAL	4	24.48
42" SP-5				
STRAIGHTS:				
	FLEX TIED WELDED AT EACH END & W/10 GA. CYL.	16.06	1	16.06
	FLEX TIED WELDED AT EACH END & W/3/16" CYL. & W/1-1/4" MUE THD OTL ℄ 2.00' FFB (3/8" x 5" BELL)	16.06	1	16.06
SHORTS:				
(15.89' OA)	FLEX TIED WELDED AT EACH END & W/3/16" CYL. (3/8" x 5" BELL)	15.64	1	15.64
ELBOWS:				
7°-28'	FLEX TIED WELDED AT EACH END	1.01	1	1.01
24°-21'	FLEX TIED WELDED AT EACH END (3/8" x 5" BELL)	2.03	1	2.03
24°-21'	FLEX TIED WELDED AT EACH END W/2.82' EXT. AT LJ BELL END (3/8" x 5" WALL)	4.85	1	4.85
REDUCER:				
42" LJ BELL x 36" LJ SPIGOT CONCENTRIC (4.22' OA)	FLEX TIED WELDED AT EACH END	3.98	1	3.98
ADAPTERS:				
42" LJ SPIGOT x FLANGE (1.69' OA)	FLEX TIED WELDED AT LJ SPIGOT	1.44	1	1.44
42" LJ BELL x FLANGE (1.67' OA)	FLEX TIED WELDED AT LJ BELL (3/8" x 5" BELL)	1.67	1	1.67
42" LJ SPIGOT x VICTAULIC END (2.28' OA)	FLEX TIED WELDED AT LJ SPIGOT	2.03	1	2.03
TEE:				
42" LJ SPIGOT x 42" LJ BELL x 36" LJ SPIGOT (6.81' OA ON RUN)	(BRANCH LL = 3.11') FLEX TIED WELDED AT EACH 42" & FIELD WELDED AT 36" LJ SPIGOT END	6.56	1	6.56
42" LJ SPIGOT x 42" LJ BELL x 42" LJ BELL (7.77' OA ON RUN)	(BRANCH LL = 3.53') FLEX TIED WELDED AT EACH END (3/8" x 5" RUN)	7.52	1	7.52
42" VICTAULIC END DISHED BULKHEAD END W/3" FLG OTL		0.00	1	0.00
		TOTAL	13	78.85

PIPE LAYING SCHEDULE

ERIE COUNTY, NEW YORK
PLEASANT PUMPING STATION & TANK
AND MODIFICATION AT WINDOM PUMPING STATION
48" SP-5
JOB NO. WH-69-24

INTERPACE CORPORATION

LOCK JOINT PIPE PRODUCTS

DATE: 9-11-69 BY: RHN:mh SHEET: 16

LINE REFERENCE 13A

PCS	DESCRIPTION		AVG LL	HOR LL	STATION	ANGLE	TANGENT	ELEV CHANGE	C/L ELEV
	BEGIN AT SOUTH WALL OF PLEASANT PUMP STATION & LAY BELLS AHEAD SOUTH				-0+02.50				788.00
1	48" FLANGE x LJ BELL WALL FITTING (2.50' OA) FLEX TIED WELDED AT LJ BELL		2.50	2.50		0°-00'	0.0000		-2.00
					0+00.00				INV 786.00
1	SHORT (7.25' OA) FLEX TIED WELDED AT EACH END & W/12 GA. CYL.		7.00	7.00					↑
					0+07.00				788.00
1	4" BEVEL UP OPEN JT 3/8" ON LONG SIDE FLEX TIED WELDED AT EACH END & W/12 GA. CYL.		15.90	15.85		4°-37	.08087		
					0+22.85				INV. 787.28
2	STRAIGHTS FLEX TIED WELDED AT EACH END & W/12 GA. CYL.		32.14	32.03					
					0+54.88				INV. 787.87
1	SHORT (11.25' OA) FLEX TIED WELDED AT EACH END & W/10 GA. CYL.		11.00	10.96					
					0+65.84				INV. 790.75
1	48" LJ SPIGOT x 48" LJ BELL x 48" LJ BELL TEE BRANCH LEFT (8.82' ON ON RUN)(BRANCH LL = 3.79') FLEX TIED WELDED AT EACH END (3/8" x 5" BELL ON BRANCH)	S	4.17	4.16					
		B	4.40	4.39	0+70.00 PI				INV. 791.09
								+ 5.45	
1	4" BEVEL SHORT DOWN (9.99' OA) FLEX TIED WELDED AT EACH END & W/10 GA. CYL. OPEN JT 3/8" ON LONG SIDE		9.57	9.57	0+74.39	0°-00'	0.0000		793.45
					0+83.96				-2.00 INV. 791.45
1	48" LJ SPIGOT x VICTAULIC END ADAPTER (2.29' OA) FLEX TIED WELDED AT LJ SPIGOT END		2.04	2.04					
					0+86.00				INV. 791.45
1	48" VICTAULIC END DISHED BULKHEAD W/3" FLANGE OUTLET		0.00	0.00					
					0+86.00				793.45
									-2.00
									INV 791.45

48" SP-5 → 12 GA. CYL. 1/4" WELD, 108" TOTAL WELD, 6 3/4" SEGMENT LENGTH, 16 WELD SEG, 3 1/2" SPACING.

48" SP-5 → 10 GA. CYL. 1/4" WELD, 136 1/2" TOTAL WELD, 19 1/2" SEGMENT LENGTH, 7 WELD SEG, 3 3/4" SPACING.

WELD INFO.

16,07 ~~20.88~~
16,00 786.00
,08087 1.29
787,29

800.93 #.I.
787.57
13.06

800.93#I.
787.29
13.64

38.85
.08087
27195
31080
03,79 95

128
128
1,293.92

ALL LAYING INSTRUCTIONS GIVEN LOOKING IN THE DIRECTION OF LAYING. BELLS AHEAD. THIS SCHEDULE SUPPLIED ONLY AS A GUIDE FOR DISTRIBUTING & INSTALLING PIPE & FITTINGS. ADJUSTMENTS TO MEET FIELD CONDITIONS MUST BE MADE AS REQUIRED.

PIPE LAYING SCHEDULE

ERIE COUNTY, NEW YORK
PLEASANT PUMPING STATION & TANK
AND MODIFICATION AT WINDOM PUMPING STATION
36" & 42" SP-5
OUR JOB NO. WH-69-24

INTERPACE CORPORATION

LOCK JOINT PIPE PRODUCTS

DATE: 9-12-69 BY: RHN:mh SHEET: 17

LINE REFERENCE 13E

	PCS	DESCRIPTION		AVG LL	HOR LL	STATION	ANGLE	TANGENT	ELEV CHANGE	C/L ELEV
		BEGIN AT EAST WALL OF PLEASANT PUMPING STATION & LAY BELLS AHEAD EAST								
(1)	1	36" FLANGE x LJ BELL WALL FITTING (2.50' OA) FLEX TIED WELDED AT LJ BELL END (3/8" x 5" BELL)		2.50	2.50	-0+02.50	0°-00'	.0000		787.50
(2)	1	SHORT (4.49' OA) FLEX TIED WELDED AT EACH END & W/3/16" CYL (3/8" x 5" BELL)		4.25	4.25	0+00.00				
						0+04.25				
(3)	1	90°-00' ELBOW RIGHT ROTATE CCW FOR 90°-00' HORIZ DEFL RIGHT & 7°-28' VERT DEFL UP FLEX TIED WELDED AT EACH END (3/8" x 5" BELL)	S	3.25	3.25	0+07.50 PI	7°-28'	.13102		787.50
			B	3.52	3.49	0+10.99				
(4)	1	SHORT (11.20' OA) FLEX TIED WELDED AT EACH END & W/3/16" CYL. (3/8" x 5" BELL)		10.96	10.87	0+21.86				
(5)	1	36" LJ SPIGOT x 42" LJ BELL CONCENTRIC REDUCER (4.22' OA) FLEX TIED WELDED AT EACH END		3.98	3.95	0+25.81				
(6)	1	7°-28' ELBOW DOWN FLEX TIED WELDED AT EACH END	S	0.38	0.38	0+26.19 PI			+ 2.45	
			B	0.63	0.61		0°-00'	0.0000		789.95
						0+26.80				
(7)	1	42" LJ SPIGOT x 42" LJ BELL x 36" LJ SPIGOT TEE BRANCH RIGHT (6.81' OA ON RUN)(BRANCH LL = 3.11') FLEX TIED WELDED AT EACH 42" END & FIELD WELDED AT 36" LJ SPIGOT END	S	3.16	3.16	0+29.96 PI				
			B	3.40	3.40	0+33.36				
(8)	1	STRAIGHT FLEX TIED WELDED AT EACH END & W/10 GA. CYL.		16.06	16.06	0+49.42				
(9)	1	SHORT (15.89' OA) FLEX TIED WELDED AT EACH END & W/3/16" CYL. (3/8" x 5" BELL)		15.64	15.64	0+65.06				
(10)	1	42" LJ SPIGOT x FLANGE ADAPTER (1.69' OA) FLEX TIED WELDED AT LJ SPIGOT		1.44	1.44	0+66.50				
		FLOW TUBE CHAMBER (BY OTHERS)		16.00	16.00	0+82.50				
(11)	1	42" FLANGE x LJ BELL ADAPTER (1.67' OA) FLEX TIED WELDED AT LJ BELL (3/8" x 5" BELL)		1.67	1.67	0+84.17				
(12)	1	24°-21' ELBOW UP FLEX TIED WELDED AT EACH END W/2.82' EXT. AT LJ BELL END (3/8" x 5" BELL)	S	0.91	0.91	0+85.08 PI				789.95
			B	3.94	3.59		24°-21'	.45253		
						0+88.67				

	TOTAL LENGTH OF WELD	LENGTH OF WELD SEGMENTS	NO. OF WELD SEGMENTS	SPACE BETWEEN WELD	WELD SIZE
(36" SP-5 W/3/16 CYL.) →	94"	11 3/4"	8	3 1/2"	3/8"
(42" SP-5 W/10 GA. CYL.) →	119"	17"	7	3 3/4"	1/4"
(42" SP-5 W/3/16 CYL.) →	110"	10"	11	3	3/8"

ALL LAYING INSTRUCTIONS GIVEN LOOKING IN THE DIRECTION OF LAYING. BELLS AHEAD. THIS SCHEDULE SUPPLIED ONLY AS A GUIDE FOR DISTRIBUTING & INSTALLING PIPE & FITTINGS. ADJUSTMENTS TO MEET FIELD CONDITIONS MUST BE MADE AS REQUIRED.

PIPE LAYING SCHEDULE

ERIE COUNTY, NEW YORK
PLEASANT PUMPING STATION & TANK
AND MODIFICATION AT WINDOM PUMPING STATION
36" & 42" SP-5
OUR JOB NO. WH-69-24

INTERPACE CORPORATION

LOCK JOINT PIPE PRODUCTS

DATE: 9-12-69 BY: RHN:mh SHEET: 18

LINE REFERENCE 13E

PCS	DESCRIPTION		AVG LL	HOR LL	STATION	ANGLE	TANGENT	ELEV CHANGE	C/L ELEV
1	42" LJ SPIGOT x 42" LJ BELL x 42" LJ BELL TEE, BRANCH RIGHT (7.77' OA ON RUN)(BRANCH LL = 3.53') FLEX TIED WELDED AT EACH END (3/8" x 5" BELL)	S	3.66	3.33	0+88.67				
					0+92.00 PI				
		B	3.86	3.51					
1	24°-21' ELBOW DOWN FLEX TIED WELDED AT EACH END (3/8" x 5" BELL)	S	0.91	0.83	0+95.51			+ 5.1	
					0+96.34 PI				795.05
		B	1.12	1.12		0°-00'	0.0000		
1	STRAIGHT FLEX TIED WELDED AT EACH END & W/3/16" CYL. & W/1-1/4" MUE THD OTL ON RIGHT ℄ 2.00' FFB (3/8" x 5" BELL)		16.06	16.06	0+97.46				
1	42" LJ SPIGOT x VICTAULIC END ADAPTER (2.28' OA) FLEX TIED WELDED AT LJ SPIGOT		2.03	2.03	1+13.52				
1	42" VICTAULIC END DISHED BULKHEAD W/3" FLG OTL		0.00	0.00	1+15.55				
					1+15.55				795.05
									1.75
									793.30

ALL LAYING INSTRUCTIONS GIVEN LOOKING IN THE DIRECTION OF LAYING. BELLS AHEAD. THIS SCHEDULE SUPPLIED ONLY AS A GUIDE FOR DISTRIBUTING & INSTALLING PIPE & FITTINGS. ADJUSTMENTS TO MEET FIELD CONDITIONS MUST BE MADE AS REQUIRED.

PIPE SUMMARY

INTERPACE CORPORATION

LOCK JOINT PIPE PRODUCTS

ERIE COUNTY, NEW YORK
PLEASANT PUMPING STATION & TANK
AND MODIFICATION AT WINDOM PUMPING STATION
36" SP-5
JOB NO. WH-69-24

	DATE:	BY:	SHEET:
	9-12-69	RHN:mh	13
Rev. A	5-27-70	RHN:mh	

LINE REFERENCE 13F

DESCRIPTION	AVG LL	UNITS	TOT LL
STRAIGHTS:			
FLEX TIED WELDED AT EACH END W/3/16" CYL. (3/8" x 5" BELL)	16.04	2	32.08
FLEX TIED WELDED AT EACH END W/10 GA. CYL. (3/8" x 5" BELL)	16.04	2	32.08
SHORTS:			
(4.49' OA) FLEX TIED WELDED AT EACH END W/3/16" CYL. (3/8" x 5" BELL)	4.25	1	4.25
ELBOW:			
90°-00' FLEX TIED WELDED AT EACH END (3/8" x 5" BELL)	6.77	1	6.77
36" LJ BELL x FLANGE WALL FITTING FLEX TIED WELDED AT LJ BELL (3/8" x 5" BELL)	2.50	1	2.50
36" FIELD WELDED CLOSURE (LJ SPIGOT TO LJ BELL)(3/8" x 5" BELL.)	5.83	1	5.83
	TOTAL	8	83.51

PIPE LAYING SCHEDULE

INTERPACE CORPORATION

LOCK JOINT PIPE PRODUCTS

ERIE COUNTY, NEW YORK
PLEASANT PUMPING STATION & TANK
AND MODIFICATION AT WINDOM PUMPING STATION
36" SP-5
JOB NO. WH-69-24

DATE:	BY:	SHEET:
9-12-69	RHN:mh	19
Rev. A 5-27-70	RHN:mh	

LINE REFERENCT 13F

PCS	DESCRIPTION		AVG LL	HOR LL	STATION	ANGLE	TANGENT	ELEV CHANGE	C/L ELEV
	BEGIN AT SOUTH WALL OF PLEASANT PUMPING STATION & LAY BELLS AHEAD SOUTH				-0+02.50				787.50
1	36" FLANGE x LJ BELL WALL FITTING FLEX TIED WELDED AT LJ BELL END (3/8" x 5" BELL)		2.50	2.50		0°-00'	0.0000		1.50
					0+00.00			INV.	786.00
1	SHORT (4.49' OA) FLEX TIED WELDED AT EACH END W/3/16" CYL. (3/8" x 5" BELL)		4.25	4.25					
					0+04.25			INV.	786.00
1	90°-00' ELBOW LEFT ROTATE CW FOR 90°-00' HORIZ DEFL LEFT & 2°-05' VERT DEFL UP (3/8" x 5" BELL)	S	3.25	3.25					
		B	3.52	3.52	0+07.50	PI			787.50
						1°-50'	.03201		- 1.50
					0+11.02			INV.	786.00
1	STRAIGHT FLEX TIED WELDED AT EACH END W/3/16" CYL. (3/8" x 5" BELL)		16.04	16.03				INV.	786.11
					0+27.05			INV.	786.62
2	STRAIGHTS FLEX TIED WELDED AT EACH END W/10 GA. CYL. (3/8" x 5" BELL)		32.08	32.06					
					0+59.11			INV.	787.65
1	STRAIGHT FLEX TIED WELDED AT EACH END W/3/16" GA. CYL. (3/8" x 5" BELL)		16.04	16.03				+ 2.17	
					0+75.14				789.69
								INV	788.19
	BEGIN AGAIN AT PI OF 42" x 42" x 36" TEE IN LINE 13E & LAY SPIGOT AHEAD								
					0+84.08				789.95
	36" LJ SPIGOT BRANCH OF TEE ROTATED 1'-50' DOWN & FIELD WELDED		3.11	3.11		1°-50'	.03201	INV.	788.45
					0+80.97			INV.	788.36
1	36" FIELD WELDED CLOSURE (LJ SPIGOT TO LJ BELL) (3/8" x 5" BELL)		5.83	5.83				- 0.28	
					0+75.14			INV.	789.69
									788.19

36" SP-5 / 3/16" GA. CYL. | 3/8" WELD, 94" TOTAL LENGTH, 11 3/4" SEG. LEN., 8 SEG., 3 1/2" SKIP,

36" SP-5 / 10 GA. CYL. | 1/4" WELD, 102 1/2" TOT. LENGTH, 20 1/2" SEG. LEN., 5 SEG, 4" SKIP.

ALL LAYING INSTRUCTIONS GIVEN LOOKING IN THE DIRECTION OF LAYING. BELLS AHEAD. THIS SCHEDULE SUPPLIED ONLY AS A GUIDE FOR DISTRIBUTING & INSTALLING PIPE & FITTINGS. ADJUSTMENTS TO MEET FIELD CONDITIONS MUST BE MADE AS REQUIRED.