

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

**Contract:** GHD-008

**Project No.:** 201900208

**Project Description:** Van de Water Treatment Plant Residuals Handling Upgrades

**Item Description:**






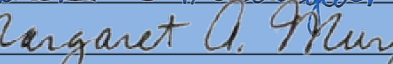

- |   |  |  |                                       |
|---|--|--|---------------------------------------|
| <input type="checkbox"/> Agreement                            | <input type="checkbox"/> Professional Service Contract | <input type="checkbox"/> Amendment                     | <input type="checkbox"/> Change Order |
| <input type="checkbox"/> BCD                                  | <input type="checkbox"/> NYSDOT Agreement              | <input checked="" type="checkbox"/> Contract Documents | <input type="checkbox"/> Addendum     |
| <input type="checkbox"/> Recommendation for Award of Contract | <input type="checkbox"/> Recommendation to Reject Bids |  |                                       |
| <input type="checkbox"/> Request for Proposals                |  |  |                                       |
| <input type="checkbox"/> Other _____                          |  |  |                                       |

**Action Requested:**

- |   |  |
|---|--|
| <input type="checkbox"/> Board Authorization to Execute                       | <input checked="" type="checkbox"/> Legal Approval                   |
| <input type="checkbox"/> Board Authorization to Award                         | <input type="checkbox"/> Execution by the Chairman                   |
| <input checked="" type="checkbox"/> Board Authorization to Advertise for Bids | <input type="checkbox"/> Execution by the Secretary to the Authority |
| <input type="checkbox"/> Board Authorization to Solicit Request for Proposals |  |
| <input type="checkbox"/> Other _____  |  |

**Approvals Needed:**

**APPROVED AS TO CONTENT:**

- |  |   |                         |
|--|---|-------------------------|
| <input checked="" type="checkbox"/> Sr. Production Engineer    | <u></u> | Date: <u>3/11/21</u>    |
| <input checked="" type="checkbox"/> Chief Operating Officer    | <u></u>  | Date: <u>3/16/2021</u>  |
| <input checked="" type="checkbox"/> Executive Engineer         | <u></u>  | Date: <u>03/16/2021</u> |
| <input checked="" type="checkbox"/> Director of Administration | <u></u> | Date: <u>03/17/2021</u> |
| <input checked="" type="checkbox"/> Risk Manager               | <u></u> | Date: <u>03/16/2021</u> |
| <input checked="" type="checkbox"/> Chief Financial Officer    | <u></u> | Date: <u>03/16/2021</u> |
| <input checked="" type="checkbox"/> Legal                      | <u></u> | Date: <u>03/16/2021</u> |

**APPROVED FOR BOARD RESOLUTION:**

- |  |   |                       |
|--|---|-----------------------|
| <input checked="" type="checkbox"/> Secretary to the Authority | <u></u> | Date: <u>03/17/21</u> |
|--|---|-----------------------|

**Remarks:** Unit price contract.

**Resolution Date:** \_\_\_\_\_

**Item No:** \_\_\_\_\_



# ERIE COUNTY WATER AUTHORITY

## INTEROFFICE MEMORANDUM

March 5, 2021

To: Terrence D. McCracken, Secretary to the Authority

From: Michael W. Wymer, Senior Production Engineer *MW*

Subject: Contract GHD-008  
Van de Water Treatment Plant Residuals Handling Upgrades  
ECWA Project No. 201900208

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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-008 includes:

1. Demolition of multiple components of the existing residuals pumping, dewatering, and handling systems including the existing filter press and sludge conveyor system.
2. Construction of a new residuals pumping, dewatering, and handling systems including two new belt filter presses, sludge collection hoppers, polymer feed system, and associated pumps, valves, and piping.
3. Architectural, structural, and electrical improvements associated with the new residuals system.
4. Site modifications including improvements to the front parking area that will improve security outside the primary entrance to the building.

Budget Information:

- Unit 2515, Item 101537 GHD-008, VDW WTP Residuals, \$2,290,000.00

MWW:jmf  
Attachments  
cc: R.Stoll  
L.Kowalski  
L.Lester

**Project Manual**

**Contract No.: GHD-008**

**Residuals Handling Upgrades  
Van De Water Water Treatment Plant**

**Project No. 201900208**

**Erie County Water Authority**

**3030 Union Road**

**Cheektowaga, New York 14227**



**ERIE COUNTY WATER AUTHORITY  
BUFFALO, NEW YORK**

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**CONTRACT NO: GHD-008  
RESIDUALS HANDLING UPGRADES  
VAN DE WATER TREATMENT PLANT**

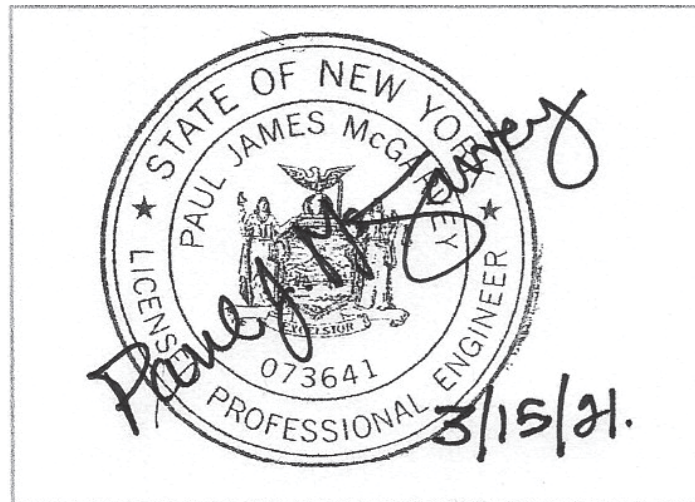
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**ECWA PROJECT NO: 201900208**

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**APRIL 1, 2021**

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



(PE Seal)

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

ERIE COUNTY WATER AUTHORITY  
BUFFALO, NEW YORK

CONTRACT No: GHD-008  
RESIDUALS HANDLING IMPROVEMENTS, VAN DE WATER WATER TREATMENT  
PLANT  
PROJECT No: 201900208

TABLE OF CONTENTS

<u>Document or Section Number</u>	<u>Name or Description</u>	<u>Initial Page</u>
<u>BIDDING REQUIREMENTS</u>		
00100	Notice to Bidders .....	00100-1
00200	Instructions to Bidders .....	00200-1
00410	Bid Forms.....	00410-1
00430	Bid Form Supplements .....	00430-1
00450	Bidder's Qualification Statement.....	00450-1
<u>CONTRACTING REQUIREMENTS</u>		
00500	Agreement.....	00500-1
00611	Performance Bond .....	00611-1
00612	Payment Bond.....	00612-1
00700	General Conditions .....	00700-1
00800	Supplementary Conditions.....	00800-1
<u>DIVISION 1 - GENERAL REQUIREMENTS</u>		
01100	Summary of Work.....	01100-1
01131	Schedule of Completion.....	01131-1
01201	Preconstruction Conference .....	01201-1
01202	Progress Meetings.....	01202-1
01210	Allowances.....	01210-1
01270	Measurement and Payment .....	01270-1
01290	Schedule of Values .....	01290-1
01310	Project Coordination .....	01310-1
01311	Coordination with Owner's Operations .....	01311-1
01331	Shop Drawing Procedures.....	01331-1
01340	Submittal Correspondence Procedure.....	01340-1
01400	Quality Control .....	01400-1
01520	Temporary Construction Facilities .....	01520-1
01521	Contractor's Field Office .....	01521-1
01522	Engineer's Field Office.....	01522-1
01523	Emergency Telephone Numbers.....	01523-1

01540	Temporary Pumping .....	01540-1
01550	Access Roads & Parking Areas .....	01550-1
01561	Security .....	01561-1
01562	Protection of the Work and Property .....	01562-1
01564	Erosion Control.....	01564-1
01620	Equipment- General .....	01620-1
01630	Substitutions.....	01630-1
01640	Transportation and Handling of Materials and Equipment.....	01640-1
01650	Starting of Systems .....	01650-1
01660	Storage of Material .....	01660-1
01700	Contract Closeout .....	01700-1
01730	Installation Data.....	01730-1
01731	Connections to Existing Facilities .....	01731-1
01735	Cleaning .....	01735-1
01740	Warranty Requirements .....	01740-1
01751	Starting and Placing Equipment in Operation .....	01751-1
01780	Record Documents.....	01780-1
01781	Operation and Maintenance Data .....	01781-1
01783	Spare Parts and Paint Materials .....	01783-1
01821	Instruction of Operation and Maintenance Personnel .....	01821-1

## TECHNICAL SPECIFICATIONS

### DIVISION 2 - SITE CONSTRUCTION

02050	Demolition .....	02050-1
02110	Site Clearing .....	02110-1
02112	Pavement Cutting .....	02112-1
02205	Protection of Existing Facilities .....	02205-1
02228	Compaction .....	02228-1
02316	Select Granular Materials .....	02316-1
02351	Excavation, Backfill and Trenching .....	02351-1
02510	Asphalt Concrete Paving.....	02510-1
02523	Concrete Walks .....	02523-1
02668	Disposal of Hazardous Materials Containing Lead .....	02668-1
02669	Painting of Thickener-Clarifier Tanks .....	02669-1
02734	Sanitary Sewer Manholes .....	02734-1
02820	Asbestos Abatement.....	02820-1
02900	Restoration .....	02900-1

### DIVISION 3 - CONCRETE

03300	Concrete .....	03300-1
03411	Structural Precast Concrete.....	03411-1
03600	Grout .....	03600-1

### DIVISION 4 - Masonry

04300	Unit Masonry System .....	04300-1
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## DIVISION 5 - METALS

05120	Structural Steel.....	05120-1
05500	Miscellaneous Fabrications.....	05500-1
05510	Stairs .....	05510-1
05520	Aluminum Railing Systems .....	05520-1
05331	Grating .....	05331-1

## DIVISION 9 - FINISHES

09900	Painting .....	09900-1
-------	----------------	---------

## DIVISION 11 - EQUIPMENT

11201	Tube Settler System .....	11201-1
11287	Weir Plate Accessories .....	11287-1
11291	Slide Gates .....	11291-1
11300	Pumping Equipment - General.....	11300-1
11305	Horizontal Centrifugal Solids Handling Pumps .....	11305-1
11315	Temporary Residuals Handling and Disposal.....	11315-1
11320	Thickened Sludge Pumps.....	11320-1
11325	Dewatering Pumps.....	11325-1
11333	Polymer Feed System .....	11333-1
11335	Thickener-Clarifier Sludge Collection Equipment.....	11335-1
11350	Belt Filter Press.....	11350-1
11351	Mechanical Mixing Equipment .....	11351-1

## DIVISION 14 - CONVEYING SYSTEMS

14600	Dumpster Conveying System .....	14600-1
14601	Davit Crane .....	14601-1
14602	Hoists and Monorail.....	14602-1

## DIVISION 15 - MECHANICAL

15060	Inside Process Piping .....	15051-1
15100	Valves and Appurtenances.....	15100-1
15120	Piping Specialties and Accessories .....	15120-1
15140	Testing, Cleaning, and Disinfection of Hydraulic Structures and Piping....	15140-1
15150	Supports and Anchors .....	15150-1
15170	Motors .....	15170-1

## DIVISION 16 - ELECTRICAL

16055	Electrical Work .....	16055-1
16161	Control Panels and Enclosures.....	16161-1
16191	Electrical Supports, Anchors and Fasteners.....	16191-1
16475	Overcurrent Protection Devices .....	16475-1
16480	Variable Frequency Drives .....	16480-1
16484	Contactors and Motor Starting Equipment .....	16484-1
16486	Motor Control Centers .....	16486-1
16900	Auxiliary Controls and Relays.....	16900-1
16950	Testing and Inspection .....	16950-1

## DIVISION 17 - INSTRUMENTATION

17000	Instrumentation .....	17000-1
17100	Programmable Logic Controllers.....	17100-1
17101	Programming Services .....	17101-1
17350	Weight Scales.....	17350-1

## APPENDICES

- A. Women and Minority Business Enterprise Policy
- B. Insurance Requirements
- C. Prevailing Wage Rate Schedule
- D. Asbestos and Lead Survey Report



## LIST OF DRAWINGS

<u>Sheet No.</u>	<u>Drawing Title</u>
G001	Cover Page & Index Sheet
G002	Legend
C001	Proposed Demo Plan
C002	Proposed Site Plan
C003	Site Demo Plan and Details
C004	Site Details
C005	Site Details
S001	Structural Notes
S002	Operating Floor Reinforcement
S003	Building E Operating Floor Plan
S004	Door Frame Details
S005	Distribution Box Plan and Sections
S006	Decant Chamber Plan, Stair Replacement Plan and Details
S007	Structural Details
S008	Structural Details
M001	Process Schematic
M002	Building E Basement Floor Demo Plan
M003	Building E Operating Floor Demo Plan
M004	Building E Demo Sections and Details
M005	Building E Basement Floor Plan
M006	Building E Operating Floor Plan
M007	Building E Sections and Details
M008	Building E Sections and Details
M009	Coag/Sedimentation Blowdown Pumps Plan and Section
M010	Mechanical Details
E001	Existing One Line Diagram- MCC1
E001A	Existing One Line Diagram – MCC1 Continued
E002	Existing One Line Diagram- MCC2
E002A	Existing One Line Diagram- MCC2 Continued
E003	Existing Motor Control Center Layout MCC1 and MCC2
E004	Building E Basement Floor Plan
E005	Building E Operating Floor Plan
E006	Elementary and Schematics
E007	BFP Block Diagram
E008	Coag- Sedimentation Blowdown Pumps Plan and Sections
E009	Electrical Details
I001	System P&ID
I002	System P&ID

END OF TABLE OF CONTENTS

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

CONTRACT NO: GHD-008  
RESIDUALS HANDLING UPGRADES VAN DE WATER TREATMENT PLANT  
PROJECT NO: 201900208

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, Residuals Handling Upgrades Plans and Specifications, Van De Water Treatment Plant, TOWN OF TONAWANDA. The Work consists of a single contract for the construction of improvements to the residuals handling system at the water treatment plant (WTP). Improvements consist of replacing the existing Plate and Frame Filter Press with two (2) new Belt Filter Press Systems for dewatering of WTP residuals, modifications to the coagulation basin dewatering and blowdown pumps, distribution box, Thickener-Clarifier tanks, parking lot and fountain structure, and related improvements.

Bids will be received by the Erie County Water Authority until **XX:XX** a.m. prevailing time, on (**Day, XX/XX/XXXX**) 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 Residuals Handling Upgrades Plan and Specifications, Van De Water, Town of Tonawanda." Failure to follow the above instructions could result in rejection of the bid.

Beginning at XX:00 a.m., on (Day, XX/XX/XXXX), the Contract Documents may be viewed online and ordered through Avalon Plan Room, at: [www.avalonplanroom.com](http://www.avalonplanroom.com) in the “Private Bid” section. To obtain the “Private Key Code”, to access the Contract Documents, contact Kailin Schwan ([kailin.schwan@ghd.com](mailto:kailin.schwan@ghd.com)). If you have questions on ordering from Avalon, please contact Avalon Document Services at (716) 995-7777.

Printed copies of the Contract Documents must be obtained from Avalon. The fee paid to Avalon is non-refundable. 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 nonrefundable 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, Tuesday, 04/13/2021 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 Kailin Schwan ([kailin.schwan@ghd.com](mailto:kailin.schwan@ghd.com)), email subject “ECWA Van De Water Residuals Handling Upgrades – Pre-Bid Meeting – Conference Call Request.” All requests for the login information shall be made before 9:00 a.m. local time, Monday, 04/12/2021. All prospective bidders are strongly encouraged to partake in the Pre-Bid meeting teleconference call.

Project site visit(s) are scheduled for Thursday, 04/15/2021, between the hours of 09:00 a.m. and 02:30 p.m., local time and Tuesday, 04/20/2021, between the hours of 09:00 a.m. and 02:30 p.m., local time. All parties wishing to visit the site must contact the Engineer, Kailin Schwan. All requests shall be received before 5:00 p.m. local time, Tuesday, 04/13/2021. 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 Michael J. Quinn, PE, Senior Distribution Engineer, Erie County Water Authority, 3030 Union Road, Cheektowaga, NY 14227-1097, phone (716) 685-8203, email [mquinn@ecwa.org](mailto:mquinn@ecwa.org)

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  
Phone: 716-856-2142  
Fax: 716-856-2160

ERIE COUNTY WATER AUTHORITY  
BUFFALO, NEW YORK

CONTRACT No.: GHD-008  
RESIDUALS HANDLING UPGRADES VAN DE WATER TREATMENT PLANT  
PROJECT No.: 201900208

SECTION 00200

INSTRUCTIONS TO BIDDERS

TABLE OF ARTICLES

1. Defined Terms
2. Bids Received
3. Location and Scope of Work
4. Copies of Bidding Documents
5. Qualifications of Bidders
6. Examination of Bidding Documents, other Related Data and Site
7. Pre-Bid Conference
8. Site and Other Areas
9. Interpretations and Addenda
10. Bid Security
11. Contract Times
12. Liquidated and Special Damages
13. Substitute and "Or Equal" Items
14. Subcontractors, Suppliers, and Others
15. Preparation of Bid
16. Basis of Bids; Comparison of Bids
17. Submittal of Bid
18. Modification or Withdrawal of Bid
19. Opening of Bids
20. Disqualification of Bidders
21. Bids to Remain Subject to Acceptance
22. Award of Contract
23. Contract Securities
24. Contractor's Insurance
25. Signing of Agreement
26. Notice to Proceed
27. Partnering - Not Used
28. Sales and Use Taxes
29. Additional Requirements

## 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 01100 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. OWNER has knowledge of asbestos containing materials within the work area of the coagulation basin pumps, coagulation basin pump control panels, and liquid CO<sub>2</sub> system. The CONTRACTOR'S attention is directed to the information contained in the reports listed in Section 00800 SC-4.06A 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 Site visits may be scheduled in accordance with the instructions outlined in the Notice to Bidders.

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](http://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-responsive. 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.
- 29.03 Refer to Procurement Supplementary Conditions Paragraph SC-18.07 for information on OWNER'S Purchases by Other Local Governments requirements.

END OF SECTION

ERIE COUNTY WATER AUTHORITY  
BUFFALO, NEW YORK

CONTRACT No: GHD-008  
RESIDUALS HANDLING UPGRADES  
VAN DE WATER WATER TREATMENT PLANT  
PROJECT No: 201900208

(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-008  
Residuals Handling Upgrades  
Van De Water Water Treatment Plant  
Project No. 201900208

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.

ERIE COUNTY WATER AUTHORITY  
CONTRACT NO: GHD-008  
RESIDUALS HANDLING UPGRADES

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.

<u>Addendum No.</u>	<u>Date Received</u>	<u>Addendum No.</u>	<u>Date Received</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

- 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.

ERIE COUNTY WATER AUTHORITY  
CONTRACT NO: GHD-008  
RESIDUALS HANDLING UPGRADES

- 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.

ERIE COUNTY WATER AUTHORITY  
CONTRACT NO: GHD-008  
RESIDUALS HANDLING UPGRADES

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

<u>Description</u>	<u>Estimated Quantities</u>	<u>Computed Totals</u>
Item 1 – General Construction For the construction of Residuals Handling Upgrades Plan and Specifications, the Lump Sum Price of:	1 LS	Lump Sum \$ _____
_____ Dollars		
and _____ Cents		
(\$ _____ ) Lump Sum		
Item 2 – Temporary Residuals Handling and Disposal For the furnishing and operation of Temporary dewatering Residuals Handling and Disposal, the Unit Price of:	x 700 Dry Tons	\$ _____
_____ Dollars		
and _____ Cents		
(\$ _____ ) per Dry Ton		
Item 3 – Allowance for PLC and SCADA System	1 AL	Stipulated Allowance <u>\$ 60,000</u>
_____ 60,000 _____ Dollars		
and _____ 00 _____ Cents		
(\$ 60,000.00) Allowance		
Item 4 – Contingency Allowance for Miscellaneous Repair Work.	1 AL	Stipulated Allowance <u>\$100,000</u>
_____ 100,000 _____ Dollars		
and _____ 00 _____ Cents		
(\$ 100,000.00) Allowance		

Item 5 – Security and Site Access

For the furnishing and operation of  
Security and Site Access,  
the Lump Sum Price of:

25,000 Dollars

and 00 Cents

(\$ 25,000 ) Lump Sum

1 LS

Lump Sum \$ 25,000

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.



ERIE COUNTY WATER AUTHORITY  
CONTRACT NO: GHD-008  
RESIDUALS HANDLING UPGRADES

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-008  
RESIDUALS HANDLING UPGRADES

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-008  
RESIDUALS HANDLING UPGRADES

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-008  
RESIDUALS HANDLING UPGRADES

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-008  
RESIDUALS HANDLING UPGRADES

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-008  
RESIDUALS HANDLING UPGRADES VAN DE WATER WATER TREATMENT PLANT  
PROJECT No: 201900208

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-008

Residuals Handling Upgrades VAN DE WATER WATER TREATMENT PLANT

Project No: 201900208

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)  
Bidder's Name and Corporate Seal

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
(Seal)  
Surety's Name and Corporate Seal

By: \_\_\_\_\_  
Signature and Title

By: \_\_\_\_\_  
Signature and Title  
(Attach Power of Attorney)

Attest: \_\_\_\_\_  
Signature and Title

Attest: \_\_\_\_\_

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**

<p>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.</p>
---

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 term 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-008  
WATER SYSTEM IMPROVEMENTS VAN DE WATER WATER TREATMENT PLANT  
PROJECT No: 201900208

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-008  
Water System Improvements, Van De Water Water Treatment Plant  
ECWA Project No. 201900208

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
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>

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 \*):

---

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---

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.

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

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- 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.

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- 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.

---

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- 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**

<u>Name, Location and Description of Project</u>	<u>Owner</u>	<u>Architect or Engineer</u>	<u>Contract Price</u>	<u>Percent Complete</u>	<u>Scheduled Completion</u>	<u>Reference/Contract Include Address and Phone</u>
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**ATTACHMENT B**

**SCHEDULE B  
PROJECTS COMPLETED**

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

**SCHEDULE C  
PERSONNEL**

<u>Name</u>	<u>Position</u>	<u>Date Started With This Organization</u>	<u>Date Started In Construction</u>	<u>Prior Positions and Experience In Construction</u>
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**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.

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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. \_\_\_\_\_

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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-008  
RESIDUALS HANDLING UPGRADES  
VAN DE WATER WATER TREATMENT PLANT  
PROJECT No: 201900208

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 construction of the residuals handling improvements, complete and operational with equipment and appurtenances, in the town of Tonawanda, NY. The Work includes all structures, equipment, pumps, valves, interconnections, demolition, transferring of existing services, restoration and all related work as shown on the Contract Drawings and described in the Contract Documents. 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 Service, Inc., 285 Delaware Ave, Suite 500, Buffalo, NY, who is hereinafter called the ENGINEER. GHD Consulting Service, Inc. 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 365 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 395 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 \$1,000.00 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 (10 pages).
- B. Performance Bond (2 pages).
- C. Payment Bond (2 pages).
- D. General Conditions (42 pages).
- E. Supplementary Conditions (8 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. The Drawings comprising a set entitled: Contract No: GHD-008, Residuals Handling Upgrades, Van De Water Water Treatment Plant and including:
  - Cover Sheet
  - Sheets: Cover Sheet (G001) to G002
  - C001 to C005
  - S001 to S008
  - M001 to M010
  - E001 to E009
  - I001 to I002
- L. Addenda consisting of Numbers \_\_\_\_ to \_\_\_\_, inclusive.
- M. Exhibits to the Agreement enumerated as follows:
  - 1. Exhibit 1, Bid Form (10 pages).
- N. 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:

Name: \_\_\_\_\_

Title: \_\_\_\_\_

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

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

Fax No.: \_\_\_\_\_

Designated Representative:

Name: \_\_\_\_\_

Title: \_\_\_\_\_

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

Phone 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-008  
RESIDUALS HANDLING UPGRADES  
VAN DE WATER WATER TREATMENT PLANT  
PROJECT No. 201900208

## 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-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 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-008  
RESIDUALS HANDLING UPGRADES  
VAN DE WATER WATER TREATMENT PLANT  
PROJECT No. 201900208

## 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- 008  
RESIDUALS HANDLING UPGRADES  
VAN DE WATER WATER TREATMENT PLANT  
PROJECT NO: 201900208

SECTION 00700

GENERAL CONDITIONS

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

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# TABLE OF CONTENTS

	<u>Page</u>
ARTICLE 1 - DEFINITIONS AND TERMINOLOGY .....	00700 - 7
1.01 <i>Defined Terms</i> .....	00700 - 7
1.02 <i>Terminology</i> .....	00700 - 10
ARTICLE 2 - PRELIMINARY MATTERS.....	00700 - 10
2.01 <i>Delivery of Bonds</i> .....	00700 - 10
2.02 <i>Copies of Documents</i> .....	00700 - 10
2.03 <i>Commencement of Contract Times; Notice to Proceed</i> .....	00700 - 10
2.04 <i>Starting the Work</i> .....	00700 - 11
2.05 <i>Before Starting Construction</i> .....	00700 - 11
2.06 <i>Preconstruction Conference</i> .....	00700 - 11
2.07 <i>Initial Acceptance of Schedules</i> .....	00700 - 11
ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE.....	00700 - 12
3.01 <i>Intent</i> .....	00700 - 12
3.02 <i>Reference Standards</i> .....	00700 - 12
3.03 <i>Reporting and Resolving Discrepancies</i> .....	00700 - 12
3.04 <i>Amending and Supplementing Contract Documents</i> .....	00700 - 12
3.05 <i>Reuse of Documents</i> .....	00700 - 13
ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS .....	00700 - 13
4.01 <i>Availability of Lands</i> .....	00700 - 13
4.02 <i>Subsurface and Physical Conditions</i> .....	00700 - 13
4.03 <i>Differing Subsurface or Physical Conditions</i> .....	00700 - 13
4.04 <i>Underground Facilities</i> .....	00700 - 14
4.05 <i>Reference Points</i> .....	00700 - 15
4.06 <i>Hazardous Environmental Condition at Site</i> .....	00700 - 15
ARTICLE 5 - BONDS AND INSURANCE .....	00700 - 16
5.01 <i>Performance, Payment, and Other Bonds</i> .....	00700 - 16
5.02 <i>Licensed Sureties and Insurers</i> .....	00700 - 16
5.03 <i>Certificates of Insurance</i> .....	00700 - 17
5.04 <i>CONTRACTOR'S Liability Insurance</i> .....	00700 - 17
5.05 <i>OWNER'S Liability Insurance</i> .....	00700 - 18
5.06 <i>Property Insurance (See Supplementary Conditions)</i> .....	00700 - 18
5.07 <i>(Not Used)</i> .....	00700 - 18
5.08 <i>(Not Used)</i> .....	00700 - 18
5.09 <i>(Not Used)</i> .....	00700 - 18
5.10 <i>Acceptance of Bonds and Insurance; Option to Replace</i> .....	00700 - 18
ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES.....	00700 - 18
6.01 <i>Supervision and Superintendence</i> .....	00700 - 18
6.02 <i>Labor; Working Hours</i> .....	00700 - 18
6.03 <i>Services, Materials, and Equipment</i> .....	00700 - 18
6.04 <i>Progress Schedule</i> .....	00700 - 19
6.05 <i>Substitutes and "Or-Equals"</i> .....	00700 - 19

## TABLE OF CONTENTS (CONTINUED)

	<u>Page</u>
6.06 <i>Concerning Subcontractors, Suppliers, and Others</i> .....	00700 - 20
6.07 <i>Patent Fees and Royalties</i> .....	00700 - 21
6.08 <i>Permits</i> .....	00700 - 21
6.09 <i>Laws and Regulations</i> .....	00700 - 21
6.10 <i>Taxes</i> .....	00700 - 22
6.11 <i>Use of Site and Other Areas</i> .....	00700 - 22
6.12 <i>Record Documents</i> .....	00700 - 22
6.13 <i>Safety and Protection</i> .....	00700 - 22
6.14 <i>Safety Representative</i> .....	00700 - 23
6.15 <i>Hazard Communication Programs</i> .....	00700 - 23
6.16 <i>Emergencies</i> .....	00700 - 23
6.17 <i>Shop Drawings and Samples</i> .....	00700 - 23
6.18 <i>Continuing the Work</i> .....	00700 - 24
6.19 <i>CONTRACTOR'S General Warranty and Guarantee</i> .....	00700 - 24
6.20 <i>Indemnification</i> .....	00700 - 25
 ARTICLE 7 - OTHER WORK .....	 00700 - 25
7.01 <i>Related Work at Site</i> .....	00700 - 25
 ARTICLE 8 - OWNER'S RESPONSIBILITIES .....	 00700 - 26
8.01 <i>Communications to Contractor</i> .....	00700 - 26
8.02 <i>Furnish Data</i> .....	00700 - 26
8.03 <i>Pay Promptly When Due</i> .....	00700 - 26
8.04 <i>Lands and Easements; Reports and Tests</i> .....	00700 - 26
8.05 <i>Insurance</i> .....	00700 - 26
8.06 <i>Change Orders</i> .....	00700 - 26
8.07 <i>Inspections, Tests, and Approvals</i> .....	00700 - 26
8.08 <i>Limitations on OWNER'S Responsibilities</i> .....	00700 - 26
8.09 <i>Undisclosed Hazardous Environmental Condition</i> .....	00700 - 27
8.10 <i>Evidence of Financial Arrangements</i> .....	00700 - 27
 ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION .....	 00700 - 27
9.01 <i>OWNER'S Representative</i> .....	00700 - 27
9.02 <i>Visits to Site</i> .....	00700 - 27
9.03 <i>Project Representative</i> .....	00700 - 27
9.04 <i>Clarifications and Interpretations</i> .....	00700 - 27
9.05 <i>Authorized Variations in Work</i> .....	00700 - 27
9.06 <i>Rejecting Defective Work</i> .....	00700 - 28
9.07 <i>Shop Drawings, Change Orders and Payments</i> .....	00700 - 28
9.08 <i>Determinations for Unit Price Work</i> .....	00700 - 28
9.09 <i>Decisions on Requirements of Contract Documents and Acceptability of Work</i> .....	00700 - 28
9.10 <i>Limitations on ENGINEER'S Authority and Responsibilities</i> .....	00700 - 28
 ARTICLE 10 - CHANGES IN THE WORK; CLAIMS .....	 00700 - 29
10.01 <i>Authorized Changes in the Work</i> .....	00700 - 29
10.02 <i>Unauthorized Changes in the Work</i> .....	00700 - 29
10.03 <i>Execution of Change Orders</i> .....	00700 - 29
10.04 <i>Notification to Surety</i> .....	00700 - 29
10.05 <i>Claims and Disputes</i> .....	00700 - 29

# TABLE OF CONTENTS (CONTINUED)

## Page

ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK .....	00700 - 30
11.01 <i>Cost of the Work</i> .....	00700 - 30
11.02 <i>Cash Allowances</i> .....	00700 - 32
11.03 <i>Unit Price Work</i> .....	00700 - 32
ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES .....	00700 - 32
12.01 <i>Change of Contract Price</i> .....	00700 - 32
12.02 <i>Change of Contract Times</i> .....	00700 - 33
12.03 <i>Delays Beyond CONTRACTOR'S Control</i> .....	00700 - 33
12.04 <i>Delays Within CONTRACTOR'S Control</i> .....	00700 - 33
12.05 <i>Delays Beyond OWNER'S and CONTRACTOR'S Control</i> .....	00700 - 33
12.06 <i>Delay Damages</i> .....	00700 - 34
ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK .....	00700 - 34
13.01 <i>Notice of Defects</i> .....	00700 - 34
13.02 <i>Access to Work</i> .....	00700 - 34
13.03 <i>Tests and Inspections</i> .....	00700 - 34
13.04 <i>Uncovering Work</i> .....	00700 - 34
13.05 <i>OWNER May Stop the Work</i> .....	00700 - 35
13.06 <i>Correction or Removal of Defective Work</i> .....	00700 - 35
13.07 <i>Correction Period</i> .....	00700 - 35
13.08 <i>Acceptance of Defective Work</i> .....	00700 - 36
13.09 <i>OWNER May Correct Defective Work</i> .....	00700 - 36
ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION.....	00700 - 36
14.01 <i>Schedule of Values</i> .....	00700 - 36
14.02 <i>Progress Payments</i> .....	00700 - 36
14.03 <i>CONTRACTOR'S Warranty of Title</i> .....	00700 - 38
14.04 <i>Substantial Completion</i> .....	00700 - 38
14.05 <i>Partial Utilization</i> .....	00700 - 39
14.06 <i>Final Inspection</i> .....	00700 - 39
14.07 <i>Final Payment</i> .....	00700 - 39
14.08 <i>(Not Used)</i> .....	00700 - 40
14.09 <i>Waiver of Claims</i> .....	00700 - 40
ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION.....	00700 - 40
15.01 <i>OWNER May Suspend Work</i> .....	00700 - 40
15.02 <i>OWNER May Terminate for Cause</i> .....	00700 - 40
15.03 <i>OWNER May Terminate For Convenience</i> .....	00700 - 41
15.04 <i>CONTRACTOR May Stop Work or Terminate</i> .....	00700 - 41
ARTICLE 16 - DISPUTE RESOLUTION .....	00700 - 42
16.01 <i>Methods and Procedures</i> .....	00700 - 42
ARTICLE 17 - MISCELLANEOUS .....	00700 - 42
17.01 <i>Giving Notice</i> .....	00700 - 42
17.02 <i>Computation of Times</i> .....	00700 - 42
17.03 <i>Cumulative Remedies</i> .....	00700 - 42
17.04 <i>Survival of Obligations</i> .....	00700 - 42
17.05 <i>Controlling Law</i> .....	00700 - 42
17.06 <i>Headings</i> .....	00700 - 42

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## GENERAL CONDITIONS

### ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

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#### 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 nonengineering 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

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### 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

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#### 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

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### 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 ENGINEER 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

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### 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

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#### 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

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#### 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

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### 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 of 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

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### 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

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#### 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

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### 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, expeditors, timekeepers, clerks, and other personnel employed by CONTRACTOR, whether at the Site or in CONTRACTOR'S principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 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

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### 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

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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

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#### 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

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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

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#### 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

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### 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-008  
RESIDUALS HANDLING UPGRADES  
VAN DE WATER WATER TREATMENT PLANT  
PROJECT No: 201900208

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 substantial completion will be achieved when the dewatering system, including feed pumps, BFPs, Polymer System, Washwater Pumps, and Dumpster Conveyor Systems have been installed, tested, and are operational to the satisfaction of the OWNER

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 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. Contract No. 22A and 22B Jerome D. Van De Water, Water Treatment Plant – Record Drawings date 1974
- b. Contract No. 22D Jerome D. Van De Water, Water Treatment Plant Aluminum Sludge Processing Facilities – Record Drawings date 1976

- c. Contract MP-76 Van De Water Treatment Plant Coagulation Basin Upgrades – Record Drawings date 2012

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 relied upon:

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

- a. Appendix D - Report Dated February 19, 2021, prepared by Stohl Environmental.

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 1 year and the performance Bond shall remain in effect for 2 years after....

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

SC-5.04 Add two new paragraphs immediately after Paragraph 5.03, which is to read as follows:

“SC-5.04 *Insurance Requirements*

SC-5.04.A. CONTRACTOR shall procure and maintain insurance in accordance with Insurance Requirements, as set forth in the attached Appendix B-1 and hereby made a part of these General Conditions.”

SC-5.04.B. CONTRACTOR shall require all direct and indirect subcontractors to procure and maintain insurance in accordance with the Insurance Requirements, as set forth in the Addendum Agreement attached as Appendix B-2 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 2 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 Before Work commences, the OWNER must review and approve any proposed subcontracting agreement prior to its execution. All Work performed by any SUBCONTRACTOR must be performed under supervision and control of the CONTRACTOR. As used in this paragraph, a SUBCONTRACTOR is defined in GC 1.01.A.42. Any subcontracting agreement must contain an Addendum Agreement in the form set forth in Appendix B-2.”

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

“SC-6.06.I 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 "1 year" in the first line to "2 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 15 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 15 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.

SC-18.07 Purchases by Other Local Governments

- C. The Erie County Water Authority (the "Authority") has adopted the following resolution for the purpose of allowing the following named local governments (the "Participants") to make purchases through the Authority bidding procedures.
- D. Under the following conditions, the Director of Administration may make purchasing services available to the following Participants:
  - 1. When in the opinion of the Director of Administration it will not create any burden or hardship upon the Authority and the anticipated prices will not be adversely affected thereby, the Director is authorized when he deems appropriate and as may be requested by the Participants to provide in any particular Authority bid specification that the Participants listed below shall have the right to make purchases based upon the bids received by the Authority.
  - 2. The Director of Administration, within the limits of his time and manpower, shall disseminate relevant contract information to the Participants.
  - 3. The Participants in Authority contracts will issue purchase orders directly to vendors within the specified contract period referencing the Authority contract involved and be liable for any payments due on such purchase orders.
- E. Bidders shall take notice that as a condition of the award of an Authority contract pursuant to these specifications, the successful bidder agrees to accept the award of a similar contract with any of the Participants listed below if called upon to do so. The Authority, however, will not be responsible for any debts incurred by the Participants pursuant to this or any other agreement.
- F. Necessary deviations from the Authority's specifications in the award of a Participant's contract, particularly as such deviations may relate to quantities or delivery point shall be a matter to be resolved between the successful bidder and Participants. All inquiries regarding prospective contracts shall be directed to the attention of:
  - 1. ANGOLA VILLAGE OF, Clerk-Treasurer, 41 Commercial Street, Angola, NY 14006
  - 2. ALABAMA TOWN OF, Deputy Supervisor, 2218 Judge Road, Oakfield, NY 14125

3. BENNINGTON TOWN OF, Water System Operator, 134 Clinton Street, Alden, NY 14004
4. BRANT TOWN OF, Town Clerk, Town Hall, 992 Brant-Farnham Road, Brant, NY 14027
5. COLDEN TOWN OF, Deputy Town Clerk, Town Hall, S-8812 State Road, Colden, NY 14033
6. EAST AURORA VILLAGE OF, Village Clerk, 571 Main Street, East Aurora, NY 14052
7. ELMA TOWN OF, Town Clerk, Town Hall, 1600 Bowen Road, Elma, NY 14059
8. FARNHAM VILLAGE OF, Village Clerk-Treasurer, 526 Commercial Street, Farnham, NY 14061
9. HANOVER TOWN OF, Town Clerk, 68 Hanover Street, Silver Creek, NY 14136
10. ORCHARD PARK VILLAGE OF, Clerk-Treasurer, 4295 South Buffalo Road, Orchard Park, NY 14127
11. SILVER CREEK VILLAGE OF, Village Clerk, 172 Central Avenue, Silver Creek, NY 14136

END OF SUPPLEMENTARY CONDITIONS

# TECHNICAL SPECIFICATIONS

## SECTION 01100

### SUMMARY OF WORK

#### PART 1 GENERAL

##### 1.01 LOCATION AND SCOPE OF WORK

- A. The Work is located at the Van De Water Water Treatment Plant in Erie County, NY: 3750 River Road, Tonawanda, NY, 14150.
- B. The Work to be performed under this Contract includes, but is not limited to, constructing the Work described within Article 1.01 and all appurtenances related to the Work.
- C. **Item 1 – General Construction**

##### **Mobilization and Demobilization**

- 1. The CONTRACTOR shall provide all labor, materials, tools, and equipment necessary and required to perform the Work specified herein, including:
  - a. Setting up the necessary general plant, including shops, storage areas, temporary dewatering system, CONTRACTOR's and ENGINEER's field offices, and such sanitary and other facilities as are required by local or state law or regulation. This also includes all demobilization items.
  - b. Site work, including clearing and grubbing, dewatering, grading, paving, restoration, landscaping, and disposal of debris and excavated material.
  - c. The cost of required insurance, bonds, permits, work schedule and subsequent updates and any other initiation of the Contract work.
  - d. Attendance at meetings.
  - e. Any and all required Public Notifications and shutdown notices.
  - f. Construction schedule and updates to schedule.
  - g. Final restoration of all staging and work areas after demobilization operations

##### **Building "B"**

- 1. Demolition of one self-priming pump and replacement with one new self-priming pump, new controls, and associated piping and valves.
- 2. Demolition of two horizontal centrifugal solids handling pumps and replacement with two new horizontal centrifugal solids handling pumps, new controls, and associated piping and valves.
- 3. Demolition and removal of existing control panel, including asbestos abatement.

##### **Building "C"**

- 1. Demolition of one set of exterior stairs, foundation and associated guardrails.
- 2. Installation of new aluminum stairway including guardrails, anchorage and any additional accessories shown in the Contract Drawings.

##### **Building "E"**

- 1. Demolition of one reaction mixer tank, lime and fly ash storage system, liquid lime feed system, lime slaker and lime slurry tank, lime slurry feed pumps, conditioned sludge retention tank, filtrate well, charging hoppers, vacuum cleaner system, tubular bag separator, air compressor No 2.
- 2. Demolition of two pressure filter feed pumps, pressure filter power pack, pressure filter and pump racks.
- 3. Demolition of four thickened sludge pumps and replacement with two new thickened sludge pumps, new controls, and associated piping and valves.

4. Demolition of pumps polymer aging and mixing system and its associated apparatuses and replacement with new polymer feed systems.
5. Demolition of distribution box and replace with a new distribution box including piping, mechanical mixer, new controls and any additional apparatuses required as shown on the Contract Drawings.
6. Demolition and replacement of the internal mechanisms of Thickener-Clarifier No 2.
7. Debris blasting and repainting of Thickener-Clarifier No 1 and No 2, including waste containing lead disposal.
8. Demolition of internal mechanisms of the Sludge Decant Tank and modifications to convert the Sludge Decant Tank into a Thickener-Clarifier No 1.
9. Installation of two new polymer feed systems including two polymer blending units, two feed systems, two aging day tanks, and associated piping, pumps and controls.
10. Replacement of two plate and frame filter presses with two new Belt Filter Presses and all associated pumps, piping, and controls. Addition of two control panels (housed in one enclosure) located on the operating floor of Building E including all electrical wiring needed for operating the Belt Filter Presses.
11. Installation of one new SCADA PLC Panel near Belt Filter Press Control Panel.
12. Installation of two dumpster conveying systems and controls at each of the Belt Filter Presses discharge.
13. Demolition and replacement of monorail, crane, hoist and trolley.
14. Miscellaneous electrical demolition and electrical construction including conduit and conductors, devices, panels, etc.
15. Modifications to the existing floor drain system in the basement.

#### **Landscaping/ Fountain /Parking Lot**

1. Demolition of Liquid CO<sub>2</sub> system, including asbestos abatement.
2. Demolition of existing water fountain, fountain spray pump and controls, 1,000- gal water holding tank, and piping, including return lines, as shown on the Contract Drawings and replacing with a new paved area.
3. Demolition and replacement of exterior bollards.
4. Replacement of landscaping as shown in the Contract Drawings.
5. Addition of flagpole equipped with spotlight lighting.
6. Construction of new paved parking lot and side walk, as shown in the Contract Drawings.
7. Construction of a new exterior concrete pad, as shown in the Contract Drawings.

#### **Sludge Lagoon**

1. Demolition of existing handrails surrounding the Decant Structure and replacement with new aluminum handrails
2. Installation of new aluminum grating over an existing access ladder opening.
3. Demolition of existing access ladder and replacement with new permanently attached access ladder.
4. Installation of new davit crane.

#### **D. Item 2 – Temporary Residuals Dewatering and Disposal**

1. CONTRACTOR shall provide temporary dewatering equipment including piping, apparatuses and power supply. The CONTRACTOR is responsible for sizing and choosing the temporary dewatering equipment.
2. CONTRACTOR is responsible for hauling dewatered residuals offsite and disposing at an appropriate site and obtaining the appropriate permits, as required.
3. CONTRACTOR is responsible for analyzing the dewatered residuals content of the dewatered sludge.

E. **Item 3 – PLC and SCADA System Allowance**

1. Under this Item, the CONTRACTOR shall furnish the PLC-WWTP panel and related PLC and SCADA system work for Van De Water Water Treatment Plant from Kaman Automation.

F. **Item 4 – Contingency Allowance for Miscellaneous Work**

1. Under this Item, the CONTRACTOR shall provide additional work where specifically ordered and directed by the ENGINEER and is entirely outside 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 will be included under this Item.

G. **Item 5 – Security and Site Access Work**

1. Under this Item, the CONTRACTOR shall provide the following:
  - a. Construction of one temporary on-site guardhouse, as shown on the Contract Drawings, including all labor, materials, tools and equipment necessary to construct the guardhouse.
  - b. Security personnel necessary to protect the property from loss, theft, damage and vandalism during hours of construction operation for the duration of the WORK.
  - c. Deconstruction and removal of the temporary guardhouse at the completion of the Work.

1.02 **CONTRACTS**

- A. The Work shall be constructed under one prime contract.

1.03 **WORK BY OTHERS**

- A. Work by OWNER - The Authority will operate the residuals treatment system including equalization basin, residuals pump station, lagoons, and residuals treatment system associated with the Water Treatment Building, once placed into service.

1.04 **CONTRACTOR'S USE OF PREMISES**

- A. CONTRACTOR'S use of the premises shall be confined to the areas shown on the Contract Drawings.
- B. The full use of the premises for storage, the operations of workmen and all other required construction activities will not be available to the CONTRACTOR.
- C. CONTRACTOR must share use of the premises with the OWNER and other contractors specified in Article 1.03.
- D. CONTRACTOR shall:
1. Assume full responsibility for protection and safekeeping of products stored on or off premises.
  2. Move stored products that interfere with the operations of OWNER or other contractor.
  3. Obtain and pay for all additional storage or work areas required for his operations.
  4. Obtain and pay for all permits and satisfy all permit requirements.
  5. Comply with all requirements defined in other specification sections.

- E. Limits on CONTRACTOR'S use of site are:
  - 1. OWNER will designate the area available for field offices.
- F. See General Conditions for additional requirements.

1.05 EASEMENTS AND RIGHTS-OF-WAY

- A. All work shall occur within the property limits of the Van De Water Water Treatment Plant. All construction operations within OWNER's property, public rights-of-way, easements obtained by OWNER, and the limits shown. Use care in placing construction tools, equipment, excavated materials, and products to be incorporated into the Work to avoid damage to property and interference with traffic.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

## SECTION 01131

### SCHEDULE OF COMPLETION

#### PART 1 GENERAL

##### 1.01 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 required at OWNER's facility.
- D. Bypass pumping shall be provided to pump residuals from the Sludge Pump Chamber to the Temporary Residuals Dewatering and Disposal Equipment while the equipment within Building E and Building B are being demolished and replaced. The OWNER has the right to designate the exact date in which a piece of equipment will or will not be available to the CONTRACTOR.

##### 1.02 MILESTONES

- A. Milestone M1 – Staging and Temporary Field Offices
  - 1. The General Work for Milestone M1 includes the furnishing and installation of Contractor's Field Office, ENGINEER's Field Office, temporary security, staging areas and traffic barriers.
  - 2. Milestone M1 is achieved upon furnishing and staging of Contractor's Field Office, ENGINEER's Field Office, and temporary security house.
  - 3. Milestone M1 shall operate in parallel to Milestone M2 and Milestone M3.
- B. Milestone M2 – Temporary Residuals Dewatering and Disposal Equipment- Mechanical
  - 1. The General Area of Work for Milestone M2 is the connection and operation of the Temporary Residuals Dewatering and Disposal Equipment.
  - 2. Milestone M2 includes completing all Work shown and specified within the Temporary Residuals Dewatering and Disposal Equipment including, but not limited to the following:
    - a. Provide temporary dewatering system sized according to Section 11315.
    - b. Provide temporary connections, piping, bracing and any other equipment needed to convey sludge from the Dilute Sludge Pump Chamber through the access hatch, as shown on the Contract Drawings, to the temporary belt filter press. CONTRACTOR shall redirect all flow from existing Dilute Sludge Pump Chamber to the temporary residuals dewatering and disposal equipment.
    - c. Provide temporary connections, piping, bracing and any other equipment needed to filtrate from the temporary belt filter press to Catch Basin No 3, as indicated on the Contract Drawings.
    - d. Provide temporary connections, piping, bracing and any other equipment needed to convey wash water from 2" hydrant line to the temporary belt filter press as shown on the Contract Drawings.
    - e. Successfully complete all start up and performance testing and performance period demonstration.



3. Continuous operation of Milestone M2 shall continue until the completion of Milestones M4 and M5 are completed or otherwise directed by the ENGINEER. Upon successful completion of M4 and M5, the CONTRACTOR shall disconnect all temporary connections and piping including but not limited to, disconnection from the Dilute Sludge Pump Chamber, disconnection of filtrate discharge to Catch Basin No 3, wash water connection. The CONTRACTOR shall return valves to their original position and direct flow back through the existing dilute sludge pumps.
4. Milestone M2 shall operate in parallel to Milestone M1 and Milestone M3.

C. Milestone M3 – Temporary Residuals Dewatering and Disposal Equipment- Electrical

1. Milestone M3 includes completing all Work shown and specified within the Temporary Residuals Dewatering and Disposal Equipment including, but not limited to the following:
  - a. MCC buckets from sources that will no longer be in service shall be disconnect and removed from the MCC located in Building E, as shown on the Contract Drawings, to allow for electrical requirements of the temporary belt filter press. CONTRACTOR shall connect a temporary breaker feed into the MCC that will feed into a transformer to feed the temporary belt filter presses.
  - b. Provide electrical connections required for proper operation of the temporary belt filter press into the transformer at locations specified in the Contract Drawings.
  - c. Successfully complete all start up and performance testing and performance period demonstration.
2. Continuous operation of Milestone M3 shall continue until the completion of Milestones M4 and M5 are completed or otherwise directed by the ENGINEER. Upon successful completion of M4 and M5, the CONTRACTOR shall disconnect all temporary electrical connections.
3. Milestone M3 shall operate in parallel to Milestone M1 and Milestone M2.

D. Milestone M4 – Building E Improvements

1. The General Work for Milestone M4 is all new work scheduled in Building E.
2. Milestone M4 includes completing all Work shown and specified within Building E including, but not limited to, the following improvements:
  - a. Demolition of pre-coat pumps, polymer mixing/aging tanks, charging hoppers and metering pumps, lime system and conveyor, lime slurry feed pumps, vacuum cleaning system, air compressor No 2, equalization tank, pressure filter feed pumps, existing distribution box, neutralization tank, existing thickened sludge pumps, conditioned sludge retention tank, reaction mixer tank, internal mechanisms of the existing thickener-clarifiers, Thickener-Clarifier walkways, pre-coat feeder, pressure filter, monorail and hoist, and any other equipment identified in the Contract Drawings. Demolition shall include electrical and mechanical wiring as defined in the Contract Drawings and Section 2050.
  - b. Disconnect and relocate the existing liquid lime metering pumps. Provide new application piping and tubing, valves, electrical connection and control panel, and related appurtenances required to connect and startup the relocated metering pumps.
  - c. Complete all demolition, civil, mechanical, structural, electrical, and instrumentation improvements associated with the Work specified for Milestone M4.
  - d. Complete all performance tests required for all applicable equipment installed in Building E.

- e. Submit approved Operation and Maintenance Manuals and Lesson Training Plans for all equipment included within Milestone M4 as required by Division 1. Provide training for all equipment placed into Service under Milestone M4.
3. Milestone M4 may not begin until Milestones M2 and M3 are completed, and the temporary dewatering system is operational and has been accepted by the OWNER.

E. Milestone M5 – Building B Improvements

1. The General Area of Work for Milestone M5 is the demolition and installation of two coagulation basin blowdown pumps (horizontal centrifugal solids handling pumps) and one coagulation basin dewatering pump.
2. Milestone M5 includes completing all Work shown and specified with pumps including, but not limited to the following improvements:
  - a. Demolish of the existing pumps and associated mechanical piping and valves. Install two new blowdown pumps and one new dewatering pump, concrete foundation modifications, and associated mechanical piping and valves.
  - b. Demolish associated electrical and control systems with the pumps. Install new pump electrical and control systems for the associated pumps.
  - c. Successfully complete all start up and performance testing and performance period demonstration.
  - d. Coordinate schedule for replacement of all pumps with OWNER's operations.
  - e. Submit and complete Operation and Maintenance Manuals, Owner Training, and all performance testing reports.

F. Milestone M6 – Exterior Improvements

1. The General Area of Work for Milestone M6 includes exterior site improvements.
2. Milestone M6 includes completing all Work shown and specified with the following improvements:
  - a. Demolish of one set of exterior stairs, foundation and associated guardrails and install new aluminum stairway including anchorage.
  - b. Demolition of existing handrails, access ladder, davit crane and replacement with new aluminum handrails, access ladder, davit crane and grating over access ladder including all anchorage and additional equipment specified on the Contract Drawings.
  - c. Demolition of Liquid CO<sub>2</sub> system, including asbestos abatement, and associated piping and foundation as shown on the Contract Drawings.
  - d. Coordination and obtaining permitting required for proper asbestos removal and disposal.
  - e. Demolition of existing water fountain, water holding tank and piping, including return lines, as shown on the Contract Drawings and replacing with a new parking area.
  - f. Demolition and replacement of existing blacktop located behind Building E with a new concrete pad.
  - g. Landscaping to the front of Addition of landscaping to the front of Buildings A, B, and C including the addition of a flagpole equipped with spotlight lighting as shown on the Contract Drawings.
  - h. Provide all necessary electrical, civil, structural work associated with proper installation and completion of the Work included in Milestone M6.
  - i. Submit and complete Operation and Maintenance Manuals.

### 1.03 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 <sup>(1)</sup>
Staging and Temporary Field Offices	Milestone M1	Prior to Demolition of any equipment in Building B or E.
Temporary Residuals Dewatering and Disposal Equipment- Mechanical	Milestone M2	Prior to Demolition of any equipment in Building B or E.
Temporary Residuals Dewatering and Disposal Equipment- Electrical	Milestone M3	Prior to Demolition of any equipment in Building B or E.
Building E	Milestone M4	After completion of M1, M2, and M3, and within 180 days of commencement of this milestone.
Building B	Milestone M5	After completion of M1, M2, and M3, and within 180 days of commencement of this milestone.
Exterior Improvements	Milestone M6	After completion of M1, M2, and M3, and within 180 days of commencement of this milestone.

<sup>(1)</sup>From CONTRACTOR Notice to Proceed.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

## SECTION 01201

### PRECONSTRUCTION CONFERENCE

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Preconstruction conference requirements, definition of responsibility, and procedures.

##### 1.02 RELATED SECTIONS

Section 01202 - Progress Meetings.

##### 1.03 RECONSTRUCTION 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.  
  
CONTRACTOR shall provide data required and be prepared to discuss all items on agenda.

##### 1.04 REQUIRED ATTENDANCE

- A. CONTRACTOR and major Subcontractors.
- B. OWNER.
- C. ENGINEER.

Representatives of government agencies having any form of control, if available.

##### 1.05 MINIMUM AGENDA

- A. Designation of responsible personnel.
- B. Subcontractors.
- C. Coordination with other CONTRACTORS.
- D. Construction schedule.
- E. Processing of Shop Drawings.
- F. Processing of field decisions and Change Orders.
- G. Requirements for copies of Contract Documents.
- H. Insurance in force.
- I. Schedule of Values.
- J. Schedule of Payments.

- K. Use of premises.
- L. Safety and first aid procedures.
- M. Security.
- N. Housekeeping.
- O. Field Offices.
- P. Record Drawings.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01202  
PROGRESS MEETINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Progress meetings.

1.02 RELATED SECTIONS

- A. Section 01201 - PRECONSTRUCTION CONFERENCE.

1.03 PROGRESS MEETINGS

- A. Date and Time:
  - 1. Regular Meeting: As mutually agreed upon by ENGINEER and CONTRACTOR.
  - 2. Other Meetings: On call.
- B. Place: Office at 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.

1.04 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. Any Subcontractors, materialmen, or vendors whose presence is deemed necessary by the OWNER, ENGINEER, or CONTRACTOR.

1.05 MINIMUM AGENDA

- A. Minutes of previous meeting.
- B. Progress since last meeting.
- C. Planned progress for next period.
- D. Problems.
- E. Change Orders.
- F. Applications for payment.
- G. Observations by ENGINEER.

PART 2      PRODUCTS - NOT USED

PART 3      EXECUTION - NOT USED

END OF SECTION



## SECTION 01210

### ALLOWANCES

#### PART 1 GENERAL

##### 1.01 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.

##### 1.02 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.

##### 1.03 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

3.01 SCHEDULE OF ALLOWANCES

- A. Cash Allowance:
1. Include a stipulated cash allowance of \$60,000 for Bid Item 3 - Stipulated Allowance for PLC and SCADA System Work as defined in Section 01270.
  2. Include a stipulated cash allowance of \$100,000 for Bid Item 4- Stipulated Allowance for Miscellaneous Repair Work to be used to provide the services of a security firm to provide guard services at the plant site.
  3. Include a stipulated cash allowance of \$25,000 for Bid Item 5 - Allowance for Security and Site Access for the furnishing and operation of Security and Site Access as defined in Section 01270.

END OF SECTION

## SECTION 01270

### MEASUREMENT AND PAYMENT

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. The items listed below beginning with Article 1.04, refer to and are the same pay items listed in the Bid Form. They constitute all of the pay items for the completion of the Work. No direct or separate payment will be made for providing miscellaneous temporary or accessory works, plant, services, ENGINEER's and/or CONTRACTOR's field offices, layout surveys, job signs, sanitary requirements, permits, testing, safety devices, shop drawings and samples, approval and record drawings, water supplies, power, maintaining traffic, removal of waste, watchmen, bonds, insurance, test pits, and all other requirements of the General Conditions, Supplementary Conditions, and the General Requirements. Compensation for all such services, things and materials shall be included in the prices stipulated for the lump sum and unit price pay items listed herein.
- B. The lump sum and unit bid prices 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.

##### 1.02 ENGINEER'S ESTIMATE OF QUANTITIES

- A. ENGINEER'S estimated quantities for unit price pay items, if any, as listed in the Bid Form, are approximate only and are included solely for the purpose of comparison of Bids. OWNER does not expressly or by implication agree that the nature of the materials encountered 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. CONTRACTOR will not be entitled to any adjustment in a unit bid price as a result of any change in an estimated quantity and agrees to accept the aforesaid unit bid prices as complete and total compensation for any additions caused by changes or alterations in the Work ordered by OWNER.

##### 1.03 RELATED PROVISIONS

- A. Payments to CONTRACTOR: Refer to General Conditions and Agreement.
- B. Changes in Contract Price: General Conditions.
- C. Schedule of Values: Section 01290.

##### 1.04 BID ITEMS

- A. ITEM 1 – GENERAL CONSTRUCTION.
  - 1. Measurement: Work under this Item shall generally be as specified in Section 01010, Summary of Work, as shown on the Contract Drawings and as specified in Divisions 1 through 17 that is not specifically included in other items.
  - 2. Payment:
    - a. The lump payment for Item 1 will be full compensation for completing the Work as shown and specified under Item 1, General Construction.
    - b. Payment for the work completed of Item 1 shall be made at the GENERAL CONTRACTOR's bid, as stated in the bid. The amount bid shall be made payable to the GENERAL CONTRACTOR in increments of ten percent (10%) of the

Contract bid. Ten percent (10%) 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 ten percent (10%) 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.

B. ITEM 2 – TEMPORARY RESIDUALS HANDLING AND DISPOSAL

1. Work under this Item shall generally be as specified in Section 01010, Summary of Work, as shown on the Contract Drawings and as specified in Divisions 1 through 17.
2. Measurement: The cost to furnish, operate, and meet the requirements of Bid Item 2, as specified in Divisions 1 through 17, shall be determined by the quantity of solids disposed by the temporary residuals handling operations on a dry tons basis.
  - a. Bidders acknowledge that estimated quantities are not guaranteed and are solely for the purposes of comparison of Bids, and final payment for all Unit Price Work will be based on actual quantities, determined as provided in the Contract Documents.
3. Payment:
  - a. Payment under this Item shall be made at the unit price bid per dry ton of solids disposed of, as shown and specified, and shall be full payment for the completed work. Contractor is responsible for the cost of solids testing and shall provide the solids content lab reports and dewatered sludge manifests with each payment request.

C. ITEM 3 - ALLOWANCE FOR PLC AND SCADA SYSTEM

1. Measurement:
  - a. This allowance is to cover the cost of work by OWNER system integrator Kaman Automation to furnish a complete PLC-WWTP panel and related PLC and SCADA system work to OWNER for Van De Water Water Treatment Plant. The GENERAL CONTRACTOR will only receive payment under this item for the actual cost from Kaman Automation to complete their required work.
  - b. In general, this work includes:
    - 1) Material and equipment including relocating existing Ethernet switches, existing PLC equipment upgrades for addition of control and monitoring of various areas, network switches, analog and digital input and output modules, and associated electrical and control components as required to complete the work.
    - 2) Engineering, including panel layout, panel schematic, and analog circuit loop diagrams, digital circuit loop diagrams, and as-built documentation.
    - 3) Fabrication and delivery of all new control panels. Retrofit of existing panels as shown. Onsite panel retrofit labor.
    - 4) Coordination with and on-site technical support for the CONTRACTOR.
    - 5) PLC and SCADA configuration.
    - 6) Programming for all furnished and existing PLCs as required to provide the monitoring and control functions required for the various plant upgrades, including software testing.
    - 7) Modifications to the existing plant SCADA system as required to incorporate new inputs and outputs, database tags, historical tags, display screens, and modifications to the existing screens as required.
    - 8) Start-up services, checkout/commissioning support, and PLC/SCADA troubleshooting support.
    - 9) Training of OWNER personnel, including training manuals, final O&M manuals, presentations, and video recordings.

- c. Work NOT included in this Item consists of the following:
        - 1) Installation of PLC control panels.
        - 2) Furnishing and installing conduit and wiring, Ethernet cables, fiber optic cables, fiber optic jumper cables.
        - 3) Furnishing and installing local control stations for equipment.
        - 4) Providing field instruments as specified in Division 17.
      - d. Work not included in Item 3, but nevertheless required to complete the Project, shall be performed by the CONTRACTOR as part of the work under lump sum Bid Item 1 - General Construction.
    - 2. Payment:
      - a. The CONTRACTOR will only receive payment under this Item for actual 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.
- D. ITEM 4 – CONTINGENCY ALLOWANCE FOR MISCELLANEOUS REPAIR WORK
- 1. Measurement:
    - a. The allowance is to cover the cost of extra general construction work items only as ordered and directed by the ENGINEER over and above the Work as shown and specified in these Contract Documents. No payment shall be made where changes in the Work are required in the field due to CONTRACTOR error or preferred means and method of the CONTRACTOR to efficiently complete the Work. In the case of error of preferred means or method, the Work shall be performed by the CONTRACTOR at no additional cost to the OWNER and no payment will be made under this Item. The CONTRACTOR will only receive payment under this Item for actual extra Work performed 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.
  - 2. Payment:
    - a. The CONTRACTOR will only receive payment under this Item for actual 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.
- E. ITEM 5 – SECURITY AND SITE ACCESS
- 1. Under this Item, the CONTRACTOR shall provide the following:
    - a. Measurement: Work included in this item shall include all construction costs including labor, materials, equipment, and tools necessary to facilitate one temporary on-site guardhouse, as shown on the Contract Drawings. This Item shall also include all costs associated with staffing temporary guard personnel during the hours of construction operations and operating procedures outlined in Division 1 including, but not limited to:
      - 1) Development of a security protocol.
      - 2) Identification badges.
      - 3) Vehicle identification tags.
    - b. No payment shall be made where changes in the Work are required in the field due to CONTRACTOR error or preferred means and method of the CONTRACTOR to efficiently complete the Work. In the case of error of preferred means or method, the Work shall be performed by the CONTRACTOR at no additional cost to the OWNER and no payment will be made under this Item.
  - 2. Payment:
    - a. The lump payment for Item 5 will be full compensation for completing the Work as shown and specified under Item 5, Security and Site Access.

PART 2      PRODUCTS - NOT USED

PART 3      EXECUTION - NOT USED

END OF SECTION

## SECTION 01290

### SCHEDULE OF VALUES

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- 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.

##### 1.02 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. CONTRACTOR may include an item for bond, insurance, temporary facilities and job mobilization on lump sum project only.
- D. Schedule of Values shall be prepared on 8-1/2-inch by 11-inch white paper.
- E. Use Table of Contents of the Specifications as basis for schedule format and identify each item with number and title in the Table of Contents. List sub-items of major products or systems as appropriate or when requested by ENGINEER. Identify site mobilization, bonds and insurance, record drawings, photographs, O&M manuals, and each motor equipment item. Show cost breakdown for each lump sum item.
- F. Include in each line item, the amount of Allowances specified in Section 01210.
- G. When requested by ENGINEER, support values with data that will substantiate their correctness.
- H. The sum of the individual values shown on the Schedule of Values must equal the total Contract Price.
- I. Each item shall include a directly proportional amount of the CONTRACTOR'S overhead and profit.
- J. Schedule shall show the purchase and delivery costs for materials and equipment that the CONTRACTOR anticipates he shall request payment for prior to their installation.
- K. Included in the detailed breakdown shall be a line item for "Record Documents." This amount is for preparing and supplying required information and documentation as described in Section 01780.



1.03 SUBMITTAL

- A. Submit three copies of schedule to ENGINEER for approval 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. After review by ENGINEER, revise and resubmit Schedule as required until it is approved.

1.04 APPLICATIONS FOR PAYMENT

- A. Submit three copies of each application.
- B. Content and Format - Approved Schedule of Values will be used to list items in Application for Payment. Certification by CONTRACTOR must accompany each application.
- C. Payment Period - Monthly.
- D. Attach required documents and CONTRACTOR's back-up data, including updated schedule and all invoices for stored materials.
- E. CONTRACTOR shall have all as-builts/record drawings current and up to date prior to submitting Application for Payment. The status of these drawings shall be verified by ENGINEER's representative during review of Application for Payment.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

## SECTION 01310

### PROJECT COORDINATION

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. As more fully set forth in Article 6 of the General Conditions, CONTRACTOR shall be solely responsible for coordination of all of the Work. He shall supervise, direct and cooperate fully with all Subcontractors, manufacturers, fabricators, suppliers, distributors, installers, testing agencies and all others whose services, materials or equipment are required to ensure completion of the Work within the Contract Time.
- B. As more fully set forth in Article 7 of the General Conditions, CONTRACTOR shall cooperate with and coordinate his Work with the work of any other contractor, utility service company or OWNER'S employees performing additional work related to the Project at the site.
- C. CONTRACTOR shall not be responsible for damage done by contractors not under his jurisdiction. He will not be liable for any such loss or damage unless it is through the negligence of CONTRACTOR.
- D. CONTRACTOR shall maintain sufficient competent personnel, drafting equipment and supplies at the site 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 plumbing Subcontractors, CONTRACTOR will ensure that each Subcontractor maintains the required personnel and facilities at the site.
- E. CONTRACTOR shall also coordinate his Work with the work of others to assure compliance with schedules.
- F. CONTRACTOR shall attend and participate in all project coordination or progress meetings and report on the progress of all Work and compliance with schedules.

#### PART 2 PRODUCT - NOT USED

#### PART 3 EXECUTION - NOT USED

END OF SECTION

## SECTION 01311

### COORDINATION WITH OWNER'S OPERATIONS

#### PART 1 GENERAL

##### 1.01 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.

##### 1.02 SECTION INCLUDES

- A. Related Sections:
  - 1. Section 01110 - SUMMARY OF WORK.
  - 2. Section 01131 - SCHEDULE OF COMPLETION.

##### 1.03 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. 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.
  - 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 must coordinate all equipment shutdowns with the OWNER.
  - 5. The OWNER will operate all existing valves/gates for isolating or removing equipment or process from service. The CONTRACTOR will be responsible for locking out / tagging out all equipment, in coordination with the OWNER. The OWNER does not guarantee a seal-tight connection upon closing of existing valves or gates.

6. The CONTRACTOR shall be prepared to stop work and return the process or equipment to service upon request from the OWNER. 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. It should be recognized that 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.
7. 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.
8. The CONTRACTOR shall be responsible for dewatering operations and/or temporary bypass pumping provisions, as required or further described in these specifications.
9. 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.

#### 1.04 COORDINATION

- A. The CONTRACTOR shall be responsible for overall coordination and scheduling of Work performed.
- B. 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.
- C. 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.
- D. In finished areas, unless indicated otherwise, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. The CONTRACTOR shall not be responsible for damage done by Contractors not under his jurisdiction. The CONTRACTOR will not be liable for any such loss or damage unless it is through the negligence of the CONTRACTOR or his subcontractors.
- F. 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.
- G. Coordinate completion and cleanup of Work of separate sections in preparation for Substantial Completion.
- H. The CONTRACTOR shall coordinate with the OWNER for making operational changes.
- I. 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, 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.

- J. All new equipment must be fabricated, on-site, and prepared for installation before initiation of any process shutdown/interruption.
- K. The CONTRACTOR will be 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 new or refurbished.
- L. The CONTRACTOR will be responsible for locking and unlocking the site security gate at the beginning and end of each workday.

#### 1.05 SEQUENCE OF CONSTRUCTION

- A. The sequence of construction proposed by the CONTRACTOR shall be included as part of the work plan and must meet the following minimum criteria:
  - 1. Shutdown 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 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 OPERATOR determine that said proposal adequately meets the criteria set forth in these specifications, the ENGINEER and OPERATOR 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.
- D. Work shall be performed in the specie 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.
- E. The Work shall be constructed without disruption to the normal operation of the Authority except as noted in this Section, Section 01731, and as otherwise approved by the OWNER.
- F. It is hereby understood that Time is of Essence in performing all Work, but especially in the time that water production at the facility is interrupted or limited by the Equalization basin, residuals pump station, a lagoon, electrical supply or other facility or equipment is out of service. Disruption of water production shall be minimized and be coordinated with the ENGINEER and OWNER.
- G. The CONTRACTOR shall complete the Work so as to meet the Milestone, Substantial Completion, and Final Completion dates established in the Contract Documents.
- H. Complete and submit shop drawings to ENGINEER. All major process equipment and structural shop drawings shall be approved within 60 consecutive calendar days of Notice to Proceed. Shop drawings that shall be approved include, but are not limited to, residuals pumps, submersible mixers, sluice and slide gates, all chemical feed equipment, piping and valving, temporary supports, related structural, electrical and instrumentation work, and all concrete and metals submittals.
- I. Establish staging areas and place field offices for CONTRACTOR and ENGINEER.

- J. The CONTRACTOR shall complete the Work so as to meet the Milestone, Substantial Completion, and Final Completion dates established in the Contract Documents.
- K. Construct the Work in the following sequence:
1. Complete and submit shop drawings to ENGINEER. All major process equipment and structural shop drawings shall be approved within 60 consecutive calendar days of Notice to Proceed and prior to the Residuals Handling System being taken off-line. Shop drawings that shall be approved include, but are not limited to, thickened sludge pumps, horizontal centrifugal solids handling pumps, self-priming pump, thickener-clarifier design, Belt Filter Presses, submersible mixers, all polymer feed equipment, piping and valving, temporary supports, related structural, electrical and instrumentation work, and all concrete and metals submittals.
  2. Establish staging areas and place field offices for CONTRACTOR and ENGINEER. (Milestone M1).
  3. Provide temporary residuals dewatering system (including temporary pumps), and test until system is acceptable to the OWNER. (Milestones M2 and M3).
  4. Complete all work in Building E (Milestone M4).
  5. Complete all work in Building B (Milestone M5).
  6. Complete all exterior site work – fountain demolition, paving, stairway, CO2 system demolition, concrete pad, etc. (Milestone M6)
  7. Milestones M1, M2, and M3 must be completed prior to commencing work toward Milestones M4 and M5.
  8. Milestones M4, M5, and M6 may be performed in parallel.
  9. During construction of Milestones M4 and M5, CONTRACTOR must dewater all residuals produced on site utilizing the Temporary Residuals Dewatering System. At no time may the existing lagoon be utilized by the CONTRACTOR.
- L. The CONTRACTOR shall coordinate work with the OWNER. Facility shut downs and tank isolations must be scheduled and coordinated with the OWNER.
- M. The CONTRACTOR shall coordinate the piping and valve installations/replacements with the OWNER. Piping isolations, tank draining, and pump station shut downs must be scheduled and coordinated with the OWNER. Work shall be scheduled so that shutdowns and tank draining is limited to the minimum amount possible throughout the duration of the project.
- N. 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.
- O. The one Thickener-Clarifier shall be shutdown at a time. After the replacement of one Thickener-Clarifier, Construction on the second Thickener-Clarifier upgrades shall begin after the successful startup of the first Thickener-Clarifier. The CONTRACTOR cannot begin replacement of the second Thickener-Clarifier until a demonstrating a 1-week period without any process interruptions.
- P. Temporary (bypass) pumping shall be installed, operational, and performance tested prior to the CONTRACTOR beginning any demolition work.

#### 1.06 TIE-INS

- A. Table 01311-A lists connections by the CONTRACTOR to existing facilities. This list may not include all tie-ins. CONTRACTOR shall perform tie-ins required to complete the Work. For tie-ins not included in Table 01331-A, obtain requirements for tie-ins from ENGINEER.

- B. Electrical System Modifications
  - 1. MCC-1 (BUS 1-A-3) Sludge Processing Facility.
  - 2. MCC-2 (BUS 1-B-4) Sludge Processing Facility.
  - 3. Shut downs of existing MCC's to perform this work shall be limited to 4 hours or less, provide multiple shutdowns as required.

## 1.07 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 temporality 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. Pre-fabrication 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. Each shutdown will be performed only once. 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.
- 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**

<b>Schedule Sequence No.</b>	<b>Shutdown/Tie-in Location</b>	<b>Action/New Facilities and Service</b>	<b>Existing (Connecting) Facilities and Service</b>	<b>Required Sequence</b>	<b>Milestone</b>	<b>Maximum Duration</b>
1	Exterior parking lot identified on Drawings, and temporary power feed from Building E	Furnish and install Contractor's Field Trailer, Engineer's Field Office, temporary security, and staging area(s)	N/A	N/A	M-1	2 Weeks
2	Dilute Sludge Pump Chamber	Furnish, install, and test temporary pumping system from Dilute Sludge Pump Chamber to Temporary Dewatering System	Temporary Residuals Dewatering System	Prior to any shutdowns of equipment in Building E	M-2	3 Weeks for installation, anticipated 180 day duration of operation
3	Exterior parking lot identified on Drawings, and temporary power feed from Building E	Furnish, install, and test Temporary Residuals Dewatering System	Temporary Pumping System at Dilute Sludge Pump Chamber	Prior to any shutdowns of Equipment in Building E	M-3	3 Weeks for installation, anticipated 180 day duration of operation
4	Building E	All work in Building E, including demolition of existing equipment, installation of new equipment, and startup/commissioning	Connect to existing utilities in Building E	To be completed while Temporary Residuals Dewatering System is operational	M-4	180 Days
5	Building B	Replace Coagulation Basin Dewatering and Blowdown Pumps	Connect to existing utilities in Building B	N/A	M-5	180 Days
6	Exterior	Complete all exterior site improvements	N/A	N/A	M-6	180 Days

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL

- A. Work shall conform to requirements of Section 01723, Cutting and Patching, and Section 01731, Connections to Existing Facilities.

- B. 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 suggested sequencing, 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 Time shall be accounted for in CONTRACTOR'S bid. Failure to account for constraints shall not be cause for delay or additional cost to the OWNER.
- C. The CONTRACTOR is ultimately responsible for their means and methods and safety programs associated with the Work.

END OF SECTION

## SECTION 01331

### SHOP DRAWING PROCEDURES

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. Shop Drawing procedures shall conform to requirements of General Conditions and as described in this Section.

##### 1.02 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 and OWNER 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:

- i. 15073-01-01 - Field lock gaskets for DIP (first review cycle)
- ii. 15073-01-02 - Field lock gaskets for DIP (second review cycle)
- iii. 15073-02-01 - Flange pipe and fittings (first review cycle)
- iv. 15073-02-02 - Flange pipe and fittings (second review cycle)
- v. 15073-02-03 - Flange pipe and fittings (third review cycle)

I. The CONTRACTOR shall initially submit to ENGINEER a minimum of six copies of all submittals that are on 8-1/2-inch by 11-inch or smaller sheets. CONTRACTOR shall also provide electronic copies of all submittals in PDF format to the ENGINEER and OWNER. Four copies of each shop drawing will be retained by the ENGINEER.

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, two copies 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 1.02.U 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 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.
- 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 01340

### SUBMITTAL AND CORRESPONDENCE PROCEDURE

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Proposed products list.
- D. Shop drawings.
- E. Product data.
- F. Samples.
- G. Manufacturers' installation instructions.
- H. Manufacturers' certificates.

##### 1.02 RELATED SECTIONS – NOT USED

##### 1.03 SUBMITTAL PROCEDURES

- A. Submittals of Shop Drawings, etc. shall be made to: GHD Consulting Services Inc., 285 Delaware Avenue, Suite 500, Buffalo, NY 14202, Attention: Construction Administration Department. All submittals and drawings shall be in the English language.
- B. A letter of transmittal shall accompany each submission. If data for more than one Section of the Specifications are submitted, a separate transmittal letter shall accompany each Section submitted.
- C. When requested, one (1) copy also shall be sent to the OWNER.
- D. At the beginning of each letter of transmittal and each letter of inquiry, provide a reference heading indicating the following:
  - 1. OWNER's Name.
  - 2. Project Name.
  - 3. Contract Number.
  - 4. Transmittal Number.
  - 5. Section and Item Number.
- E. All submittals for approval shall have an identifying title. The CONTRACTOR should have a rubber stamp made for affixing this title. The Section and Item number shall be completed in ink.

- F. All submittals shall bear the stamp of approval and signature of the CONTRACTOR as evidence that they have been reviewed by the CONTRACTOR. Submittals without this stamp of approval will not be reviewed by the ENGINEER and will be returned to the CONTRACTOR. The stamp shall contain the following minimum information:

CONTRACTOR NAME:	
Date:	
REFERENCE	
Item:	
SPECIFICATION	
Page No:	
Paragraph No:	
Drawing No:	
Location:	
Submittal No:	
Approved By:	

- G. A number shall be assigned to each submittal by the CONTRACTOR starting with No. 1 and thence numbered consecutively. Resubmittals shall be identified by the same number followed by the suffix "A" for the first resubmittal, the suffix "B" for the second resubmittal, etc.
- H. The CONTRACTOR shall submit to the ENGINEER a minimum of eight (8) copies and one (1) electronic PDF of each Shop Drawing. All Shop Drawings shall be emailed to the OWNER and ENGINEER. If file sizes are larger than 6 MB, then separate into multiple files/emails.
- I. After the ENGINEER completes his review, the submittal will be marked with one (1) of the following notations:
1. Approved.
  2. Furnish as Corrected.
  3. Revise and Resubmit.
  4. Rejected.
- J. If a submittal is acceptable, it will be marked "Approved" or "Furnish as Corrected." Two (2) prints or copies of the submittal will be returned to the CONTRACTOR.
- K. Upon return of a submittal marked "Approved" or "Furnish as Corrected," the CONTRACTOR may order, ship, or fabricate the materials included on the submittal, provided it is in accordance with the corrections indicated. For extensive corrections or corrections of major importance affecting other items, the ENGINEER may require that the CONTRACTOR make the corrections indicated thereon and resubmit for a final review.
- L. If a submittal is unacceptable, two (2) copies will be returned to the CONTRACTOR with one of the following notations:
1. "Revise and Resubmit."
  2. "Rejected."

- M. Upon return of a submittal marked "Revise and Resubmit," the CONTRACTOR shall make the corrections indicated and repeat the initial approval procedure. The "Rejected" notation is used to indicate material or equipment that is not acceptable. Upon return of a submittal so marked, the CONTRACTOR shall repeat the initial approval procedure utilizing acceptable material or equipment.
  - N. Submittals not bearing the ENGINEER's "Approved" notation shall not be issued to subcontractors nor utilized for construction purposes. No work shall be performed or equipment installed without an "Approved" drawing or submittal.
  - O. In the event the CONTRACTOR obtains the ENGINEER's approval for the use of equipment other than that which is shown or specified, the CONTRACTOR shall, at his own expense and using methods approved by the ENGINEER, make all changes to the Work, including structures, piping, electrical, equipment and controls, that may be necessary to accommodate this equipment.
  - P. The ENGINEER will review and process all submittals promptly, but a reasonable time should be allowed for this, for the drawings being revised and resubmitted, and for time required to return the approved drawings to the CONTRACTOR.
  - Q. It is the responsibility of the CONTRACTOR to review submittals made by suppliers and Subcontractors before transmitting them to the ENGINEER to assure proper coordination of the Work and to determine that each submittal is in accordance with the desires of the CONTRACTOR and that there is sufficient information about materials and equipment for the ENGINEER to determine compliance with the Drawings and Specifications. Incomplete or inadequate submittals will be returned for revision without review.
- 1.04 PROPOSED PRODUCTS LIST
- A. Within ten (10) days after the Notice of Award, submit list of major products proposed for used, with the name of the manufacturer, trade name, and model number of each product.
  - B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.
- 1.05 SHOP DRAWINGS
- A. Submit for review within thirty (30) days of the Notice of Award. After review, produce copies and distribute in accordance with the SUBMITTAL PROCEDURES article above.
  - B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
  - C. Prior to the Pre-construction meeting, the ENGINEER shall provide the CONTRACTOR with a list of required Shop Drawings to be submitted. The CONTRACTOR shall return the list with the anticipated schedule submittal dates for the Shop Drawings at the Pre-construction meeting. Omission of any Shop Drawings from the list shall not relieve the CONTRACTOR from responsibility to submit all items for approval.
  - D. Shop Drawings for components of systems shall be submitted as one (1) complete package, reviewed and coordinated by the CONTRACTOR, for all aspects of the system. Partial submittal packages will not be reviewed.
  - E. If Shop Drawing submittals show variation from the requirements of the Contract because of standard shop practices or for other reasons, the CONTRACTOR shall make specific mention of such variation in a letter of transmittal.

- F. Shop Drawings shall be submitted well in advance of the need for the material or equipment for construction and with ample allowance for time required to make delivery of material or equipment after data covering such is approved. The CONTRACTOR shall assume the risk for all materials or equipment, which are fabricated or delivered prior to the approval of Shop Drawings. No materials or equipment will be permitted to be incorporated into the Work nor will such be included in monthly estimates until approval thereof has been obtained in the specified manner.
- G. Approval of Shop Drawings shall not relieve the CONTRACTOR from the responsibility of furnishing materials and equipment of proper dimension, size, quality, quantity, and all performance characteristics to efficiently perform the requirements and intent of the Contract Documents. Approval shall not relieve the CONTRACTOR from responsibility for errors of any sort on the Shop Drawings. Approval is intended only to assure conformance with the design concept of the Project and compliance with the information given in the Contract Documents. The CONTRACTOR is responsible for dimensions, which shall be confirmed and correlated at the Project Site. The CONTRACTOR is also responsible for information that pertains solely to the fabrication processes or to the technique of construction and for the coordination of the Work of all trades.

#### 1.06 PRODUCT DATA

- A. Submit the number of copies, which the CONTRACTOR requires, plus two (2) copies and one (1) electronic PDF which will be retained by the ENGINEER. Submittals shall be in a format approved by the OWNER.
- B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Work.
- C. Indicate Product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- D. After review distribute in accordance with the Submittal Procedures article above.

#### 1.07 SAMPLES

- A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- B. Submit samples of finishes from the full range of the standard colors of the manufacturer, textures, and patterns for selection by the OWNER.
- C. Include identification on each sample, with full Project Information.
- D. Submit the number and size of samples specified in individual specification sections herein.
- E. Reviewed samples, which may be used in the Work, are indicated in individual Specification Sections.

#### 1.08 MANUFACTURER INSTALLATION INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to the ENGINEER in accordance with the general specifications
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.09 MANUFACTURER CERTIFICATES

- A. When specified in individual specification sections, submit certificate by manufacturer to ENGINEER in accordance with the general specifications.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Indicate manufacturer's certification of proper installation for warranty.
- D. Certificates may be recent or previous test results on the material or product, but must be acceptable to the ENGINEER.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01400  
QUALITY CONTROL

PART 1 GENERAL

1.01 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.

1.02 RELATED SECTIONS

- A. General Conditions.
- B. Supplementary Conditions.
- C. Section 01331 - SHOP DRAWING PROCEDURES.

1.03 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.

1.04 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.

#### 1.05 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.

#### 1.06 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.

#### 1.07 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.

#### 1.08 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.



1.09 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 01520

### TEMPORARY CONSTRUCTION FACILITIES

#### PART 1 GENERAL

##### 1.01 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 men 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.
- 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 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

##### 1.01 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

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- 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.

##### 1.02 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.

##### 1.03 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 conforming to local building codes.

##### 1.04 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.

##### 1.05 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.

#### 1.06 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](http://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.

#### 1.07 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

##### 1.01 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 01540

### TEMPORARY PUMPING

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Furnishing, installing, testing, and physical operation of temporary pumping systems to convey residuals from the Sludge Pump Chamber to the Temporary Residuals Handling and Disposal equipment.

##### 1.02 GENERAL

- A. CONTRACTOR is required to provide all materials, labor, equipment, power, maintenance, associated items, and superintendence to implement temporary bypass pumping systems as needed for the purpose of diverting the existing flow around the work area for the time that is required in order to comply with the CONTRACTOR's order of work and to maintain the treatment works in operation. Provide all additional temporary pumping systems needed to meet CONTRACTOR's means and methods at no additional cost to OWNER.
- B. The CONTRACTOR shall utilize temporary pumping for their completion of the Work. Separate bypass pumps shall be provided for pumping sludge from the Sludge Pump Chamber to the Temporary Residuals Handling and Disposal equipment and for pumping filtrate from the Temporary Residuals Handling and Disposal equipment to the existing Thickener-Clarifier overflow line, as indicated on the Contract Drawings. Utilization of temporary pumping allows the CONTRACTOR to complete the Work.

##### 1.03 SUBMITTALS

- A. Submit shop drawings in accordance with Section 01331, Shop Drawing Procedures, as supplemented herein.
- B. Submit a specific detailed description of each proposed temporary pumping system within 60 days prior to the intended full time use of any bypass pumping system. The submittal shall include, but not be limited to, the following:
  - 1. A written description of the plan.
  - 2. Quantity, capacity, and location of all pumping equipment.
  - 3. Pump performance curves and head capacity curves demonstrating the capability to meet all required flows.
  - 4. The size, type and routing of all suction and discharge piping and the means of connecting the system.
  - 5. Description of controls and power source.
- C. OWNER's and ENGINEER's review will include, but not be limited to, verification of compliance with performance requirements and to the maintenance of residuals flows required for OWNER's operations. ENGINEER and OWNER shall review, but not approve the bypass pumping system submittal.

##### 1.04 TEMPORARY PUMPING COORDINATION MEETING

- A. After OWNER and ENGINEER review temporary pumping system submittal(s), and prior to intended use, schedule a coordination meeting with the OWNER, ENGINEER, CONTRACTOR, and subcontractor or temporary pump supplier, if applicable.

- B. No temporary pumping shall take place until satisfactory completion of the associated coordination meeting and acceptance of the plan by OWNER and ENGINEER.

#### 1.05 PERFORMANCE REQUIREMENTS

- A. Design the installation and operation of temporary pumping systems in accordance with laws and regulations, including local noise and light ordinances.
- B. Provide fuel supply for 48 hours of operation on site and stored in accordance with laws and regulations. CONTRACTOR shall assume responsibility for all spills and regulatory fines due to failure of the temporary pumping system.
- C. Designed to meet the following performance requirements with the largest unit out of service:

Performance Requirement	Solids Handling from Sludge Pump Chamber to Temporary Residuals Dewatering Equipment
Primary design points, minimum flow at stated TDH	120 gpm at 10 feet
Maximum NPSH required at primary design point	17.9 feet
Maximum allowable shutoff head <sup>(1)</sup>	42 feet
Fluid Properties	
Fluid pumped	Residuals
Maximum sphere size	3 inches
Solids content	1.5%

(1) Lower shutoff head is acceptable.

- D. Pump Connection Points:
- Pump suction – CONTRACTOR shall convey sludge from the 8-inch diameter dilute sludge pump suction line in basement of the Dilute Sludge Pump Chamber.
  - Pump discharge – Dilute sludge shall be conveyed from Dilute Sludge Pump Chamber to the Temporary Residuals Dewatering System. CONTRACTOR is responsible for determining proper off-site disposal location and obtaining any necessary permits.
  - CONTRACTOR shall provide all fittings, piping, and other materials necessary to connect the suction and discharge piping.
- E. The bypass pumping system shall be tested for conformance with the requirements of the specifications prior to use and in the presence of the ENGINEER and OWNER to demonstrate a state of readiness of all of the equipment.
- F. Performance Test - 2-week performance test is required for the temporary pumping system in accordance with Section 01751.
- G. Provide at least one backup pump on-site and ready for operation of the same capacity as the largest temporary bypass pump. A minimum of two (one duty and one standby) pumps shall be provided for the temporary pumping system.
- For temporary pumping system with automatic backup pump operation, report to site within 60 minutes of a pump failure to ensure the automatic backup system is operating properly.

2. An additional backup pump shall be available for use on this project, to be brought to the site a maximum of 12 hours following a pump and/or system failure. This pump shall be utilized when the initial pump and/or system failure cannot be corrected within 12 hours of its occurrence.
- H. Temporary pumping systems shall be equipped with noise reduction features that limit the noise output to 65 dBA within 50 feet of the equipment or to 60 dBA at the nearest residence property line, whichever is less.
- I. See Section 01311, Coordination with OWNER's Operation, for facility outage requirements and constraints.

#### 1.06 SPECIAL PRECAUTIONS

- A. CONTRACTOR is responsible for fines levied on OWNER by state, federal, and/or other agencies due to spills caused by failure of temporary pumping systems.
- B. Provide Jersey barriers in all locations where temporary pumps, piping, and other accessories are located in roadways, driveways, and other vehicle-accessed areas.

### PART 2 PRODUCTS

#### 2.01 PUMPS

- A. The pumps and drives shall be rated for continuous duty and shall be capable of pumping the required flow ranges without surging, cavitation, or excessive vibration. Pumps shall not overload drivers at any point on the pump operating curve. Pumps shall be suitable for the material being pumped. Pumps shall be self-contained units designed for temporary use.
- B. Pumps shall be fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in the priming system.
- C. Pumps shall be powered by one of the following:
  1. Diesel powered or powered by a diesel powered generator. CONTRACTOR is responsible for diesel fuel costs associated with the temporary pumping system.
  2. Temporary 480V power. CONTRACTOR shall coordinate with OWNER for 480V power supply in existing Dilute Sludge Pump Chamber.
- D. Provide the necessary start/stop and level controls for each pump.
  1. The signal for pump start/stop control shall be generated by the OWNER's SCADA system. Existing telemetry shall be maintained (level transmitter) for use during temporary bypass pumping.
  2. Signal connections of the SCADA system to the pump control system shall be coordinated with the OWNER. Existing equipment may be utilized by the CONTRACTOR. Temporary connections from existing equipment to temporary pump control system shall be by CONTRACTOR.

#### 2.02 PIPING

- A. In order to prevent the accidental spillage, all temporary piping must be constructed of rigid or semi-rigid pipe with positive, leak proof connections. All pipe materials and joints for temporary piping systems must be accepted by ENGINEER prior to use.

- B. Pipe diameter shall be a minimum of 8 inches in diameter shall be ductile iron or fused joint high-density polyethylene (HDPE) pipe to provide a leak proof piping system. Flanged joints shall be used for exposed or submerged ductile iron pipe. Pipe joints shall be accepted by ENGINEER prior to use for temporary ductile iron or HDPE pipe.
- C. Provide heat tracing of temporary piping or other means as required to prevent freezing.
- D. Provide a temporary check valve in the temporary discharge of each pump.

#### 2.03 TEMPORARY CAPS

- A. Temporary caps shall be provided on existing piping, as needed, for the successful operation of the bypass pumping system.
- B. Caps shall be restrained joint ductile iron at all locations.

#### 2.04 PIPE SUPPORTS

- A. Pipe supports shall be provided by the temporary piping supplier for all piping that is elevated above the ground.
- B. Pipe support design shall be by the temporary pipe supplier and spacing shall be in requirements included in Section 15150 for permanent piping.
- C. Pipe support type and location shall be indicated in the shop drawing submittals.

### PART 3 EXECUTION

#### 3.01 GENERAL REQUIREMENTS

- A. Install, operate, and maintain temporary pumping systems and appurtenances, including but not limited to, associated piping, valves, instrumentation, controls, and accessories, in accordance with the manufacturer's instructions. Provide all oil, fuel, grease, lubricants, tools, and spare parts required for operation and maintenance of the temporary pumping systems for the duration of use. Remove all temporary pumping systems and appurtenances equipment following the completion of temporary pumping.
- B. CONTRACTOR is responsible for proper operation of complete temporary pumping systems, except for the start/stop signal (by OWNER).
- C. Provide hay bales and tarping systems to enclose all exterior pumps and engines to further reduce noise levels.
- D. Demonstrate all temporary pumping systems to OWNER and ENGINEER for conformance with the Contract Documents prior to use.
- E. Temporary pumping systems shall be placed in service a minimum of 72 hours before any work requiring use of the temporary pumping system may begin. Demonstrate continuous trouble-free operation for entire 72-hour period.

- F. Temporary pumping systems shall remain operable until all components of new work requiring temporary pumping systems have successfully completed all required performance testing and are accepted. Once activated, do not decommission without prior approval of the OWNER and ENGINEER.
- G. Once written permission is issued by the ENGINEER, remove all components of the temporary pumping systems. After removal of temporary pumping systems, perform all restoration work to the satisfaction of the OWNER.
- H. Take precautions to prevent spills when cutting pipelines or decommissioning existing piping.

END OF SECTION

## SECTION 01550

### ACCESS ROADS AND PARKING AREAS

#### PART 1 GENERAL

##### 1.01 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.

##### 1.02 SITE ACCESS

- A. Site Access: CONTRACTOR access to the Site shall be via the existing main gate on River Road.

##### 1.03 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.

#### 1.04 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.

#### 1.05 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.

#### 1.06 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.

#### 1.07 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

##### 1.01 SCOPE

- A. The CONTRACTOR shall safely guard all Work, materials, equipment, and property from loss, theft, damage and vandalism. 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. The CONTRACTOR shall be responsible for constructing a temporary guardhouse located on-site in accordance with Specification 01520. The CONTRACTOR is responsible for deconstructing the temporary structure at the completion of the Work.
- C. Costs for security specified in this Section shall be paid by CONTRACTOR.
- D. Maintain program throughout construction period until directed by the ENGINEER.
- E. Conform to OWNER's security procedures and access restrictions at Site throughout entire Project. CONTRACTOR, including Subcontractors and Suppliers, shall comply with the requirements outlined in this specification.

##### 1.04 ENTRY CONTROL

- A. CONTRACTOR supplied personnel shall be responsible for adhering to all Covid-19 related security policies implemented by the OWNER. The CONTRACTOR is also responsible for enforcing any COVID-19 related security policies implemented by the OWNER including restricting site-access based on the results of a pre-screening test.
- B. Restrict entrance of persons and vehicles into Project Site.
- C. Allow entrance only to authorized persons with proper identification.
- D. 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.
- E. The CONTRACTOR may make no claim against the OWNER for damage resulting from trespass.
- F. Party responsible for security shall make good all damage to property of the OWNER and others arising from failure to provide adequate security.
- G. Security measures taken by the CONTRACTOR shall be at least equal to those usually provided by OWNER to protect existing facilities during normal operation.

##### 1.05 PERSONNEL IDENTIFICATION

- A. Provide identification card to each person authorized to enter premises. All CONTRACTOR personnel shall wear at all times on-Site a badge bearing CONTRACTOR's name, personal photograph, employee's name and, as applicable, employee number.

- B. 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.
  - C. 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.
  - D. Maintain a list of accredited persons and submit copy to OWNER on request.
- 1.06 SECURITY SERVICE
- A. The CONTRACTOR shall employ watchmen during construction working hours until the Work is completed, as directed by the ENGINEER. The CONTRACTOR shall provide security and prevent unauthorized entry.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

## SECTION 01562

### PROTECTION OF THE WORK AND PROPERTY

#### PART 1 GENERAL

##### 1.01 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

##### 1.02 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.

##### 1.03 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.
- 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.

#### 1.04 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.

#### 1.05 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.

#### 1.06 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 01564  
EROSION CONTROL

PART 1      GENERAL

1.01      SECTION INCLUDES

- A.      Installation of sedimentation and erosion control barriers.
- B.      Anchoring all topsoil stockpiles with straw mulch and ringing with silt fence.
- C.      Protection of catch basins with silt fence rings.
- D.      Inspection of all erosion measures after each rainfall and at least daily during prolonged rainfall.
- E.      Repairing immediately any failed sedimentation and erosion control barrier.
- F.      Removing and disposing sediment deposits in a manner that does not result in additional erosion or pollution.
- G.      Removal of straw bales or silt fences after completion of construction and permanent stabilization of erosion.
- H.      Removal of sedimentation barriers after completion of construction.

1.02      RELATED SECTIONS

- A.      Section 02050 - DEMOLITION.
- B.      Section 02110 - SITE CLEARING.
- C.      Section 02351 - EXCAVATION, BACKFILL, AND TRENCHING.
- D.      Section 02900 - RESTORATION.

1.03      PERFORMANCE REQUIREMENTS

- A.      Observe government policy established by United States Environmental Protection Agency (USEPA) Memorandum 78-1.
- B.      Observe requirements set forth by the Federal Highway Administration Task Force 25.
- C.      Conform to all erosion and sedimentation control measures of "New York State Standards and Specifications for Erosion and Sediment Control."
- D.      Temporary erosion and sediment control measures shall be installed as the first step in construction and shall not be removed until permanent cover is completely established and stabilized.

#### 1.04 SUBMITTAL

- A. Provide shop drawing submittals as specified in Section 01331.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Hay/Straw Bales - Shall be securely tied and measure 14 inches by 18 inches by 30 inches long or greater.
- B. Silt Fence
  - 1. Propex - Silt stop, Mirafi 100X or equal meeting the physical and mechanical requirements of FHA Task Force 25 specification guide for temporary silt fence.
  - 2. Silt fence shall be constructed using fence posts and wire fence or prefabricated units in accordance with "New York State Standards and Specifications for Erosion and Sediment Control."
- C. Stakes and Fasteners
  - 1. Shall be two #3 rebar or two 2-inch by 2-inch hardwood stakes for each hay/straw bale.
  - 2. Shall be a 2-inch by 2-inch by 48-inch hardwood post for silt fences.
- D. Erosion Control Fabric - North American Green Type S75BN, NYP ECS-1B, or equal shall be used.

#### 2.02 PRODUCTS

- A. Sediment Barriers - Sediment barriers shall be stone, silt fences or other approved materials that will prevent migration of silts and sediment to receiving waters.
- B. Mulch and Seeding - Mulch and seeding shall be in accordance with the appropriate site drawings.
- C. Diversion Terraces - Diversion terraces shall be installed on the uphill side of the disturbed areas to divert surface runoff away from unstabilized slopes.
- D. Interceptor Channels - Interceptor channels shall be installed across disturbed areas where the slope is running parallel to the direction of trenches.
- E. Geotextile Dewatering Bag - Geotextile dewatering bag to be used to trap sediment from dewatering activities.

### PART 3 EXECUTION

#### 3.01 GENERAL REQUIREMENTS

- A. CONTRACTOR is responsible for complying with SPDES Permit No NY0033987.
- B. The Drawings do not show the necessary control measures to prevent erosion and sedimentation.
  - 1. It is the CONTRACTOR's responsibility to design, implement and maintain erosion and sedimentation control measures, which effectively prevent accelerated erosion and sedimentation.



- C. Earthmoving activities shall be conducted in such a manner as to prevent accelerated erosion and sedimentation.
- D. All erosion and sedimentation control measures shall be inspected by the contractor daily and immediately after periods of rainfall.
  - 1. Repair and/or maintenance of sedimentation and erosion control measures will be made as soon as needed.
  - 2. The contractor will be held responsible for the implementation and maintenance of all control measures on this site.
- E. Land disturbance shall be kept to a minimum.
  - 1. Restabilization will be scheduled immediately after any disturbance.
- F. Silt fences will be installed along the toe of all critical cut and fill slopes.
- G. Catch basins and drain inlets will be protected with silt fence or stone throughout the construction sequence and until all disturbed areas are stabilized.
- H. Erosion and sedimentation control measures will be installed prior to all construction activities.
- I. Sediment removal from control structures shall be the responsibility of the contractor.
  - 1. Sediment shall be disposed of in a manner which is consistent with overall intent of plan and which does not result in additional erosion.
- J. The erosion and sedimentation control measures described herein are intended as a general guide for the contractor.
  - 1. It is the contractor's responsibility to provide any and all work necessary to prevent erosion of soil from the construction site and to provide silt fences or other control measures as the need arises during construction at no additional cost to the owner.
- K. Remove all sedimentation and erosion control barriers after completion of construction and permanent stabilization of erosion.
- L. Dewatering activities shall be completed in accordance with project plans as well as any applicable environmental permit condition.

### 3.02 DIVERSION TERRACES

- A. Diversion terraces shall be used as a temporary measure installed on the uphill side of the disturbed areas to divert surface runoff away from unstabilized slopes, and the project area.
- B. Recommended minimum dimensions:
  - 1. Height - 1.5 feet
  - 2. Top width - 2 feet
  - 3. Side slopes - 2:1 or flatter
  - 4. Material - soil

### 3.03 INTERCEPTOR CHANNELS

- A. Interceptor channels shall be used across disturbed areas where the slope is running parallel to the direction of trenches.
- B. Interceptor channels reduce erosion by intercepting storm runoff and diverting it to outlets on the lower side of the disturbed area where it can be disposed of having minimum erosion impact.

- C. Recommended dimensions and materials:
  - 1. Depth - 0.5 feet
  - 2. Width - 2 to 4 feet
  - 3. Side slopes - 2:1 or flatter
  - 4. Spacing - where required
  - 5. Material - stable on-site material

### 3.04 TRENCH BARRIERS

- A. Trench barriers shall be used where the disturbed area is sloped in the direction of the pipeline, when the slope exceeds 15 percent.
- B. Trench barriers shall be earth-filled sacks or piled stone, stacked to the top of the trench after installation of the sewer and prior to backfill, if backfill is delayed.
- C. Trench barriers shall act as an erosion check by preventing the washout of the trench.
- D. Recommended dimensions and materials:
  - 1. Height - to top of trench
  - 2. Spacing - approximately every 150 feet
  - 3. Material - earth-filled sacks or piled stones

### 3.05 STABILIZED CONSTRUCTION ENTRANCES

- A. Stabilized construction entrances shall be constructed in accordance with the drawings.
- B. Stone base shall be replaced or maintained as needed to prevent tracking of sediment on site.
- C. Recommended dimensions and materials:
  - 1. Length - 50 feet minimum.
  - 2. Width - 12 feet minimum.
  - 3. Material - 2-inch stone or reclaimed concrete equivalent.

### 3.06 SEDIMENT BARRIERS

- A. Sediment barriers shall be used at storm drain inlets; across minor swales and ditches; and at other applications where the structure is of a temporary nature and structural strength is not required.
  - 1. Sediment barriers are temporary berms, diversions, or other barriers that are constructed to retain sediment on-site by retarding and filtering storm runoff.
- B. Recommended dimensions and materials:
  - 1. Hay or straw bales (only to be used where specifically shown on plans or per ENGINEER's request).
    - A. Bales should be bound with twine.
    - B. Bales should be anchored to the ground with fence posts, wood pickets, or #3 rebar. Two anchors per bale are required.
    - C. Bales shall be installed so that runoff cannot escape freely under the bales.
    - D. Height - 1.5 feet  
width - 1.5 to 3.0 feet  
cross-sectional area required per tributary acre - 50 square feet
  - 2. Stone:
    - A. Height - 1.5 to 2.0 feet (uniform top elevation) top
    - B. Width - 3 to 5 feet
    - C. Side slopes - 3:1 or flatter
    - D. Cross-sectional area required per tributary acre - 20 square feet
    - E. Material - coarse rock or stone

3. Brush:
  - A. Brush should be bound with twine.
  - B. Brush should be anchored such that it does not move and runoff cannot escape freely under the barrier.
  - C. Height - 1.5 to 2.0 feet  
cross-sectional area required per tributary acre - 15 square feet
4. Silt fence:
  - A. Synthetic fabric 48 inches wide for fencing material.
  - B. 2-inch by 4-inch wooden stakes at 8 to 10 feet apart for posts.
  - C. Height - +30 inches above ground.

### 3.07 GEOTEXTILE DEWATERING BAG

- A. Used for dewatering activities, geotextile dewatering bag shall be placed within a stabilized upland area.
- B. Stabilized area shall consist of a stone bedding of no. 1 stones, 6 inches deep.
- C. Dewatering bag shall be removed from site following dewatering, prior to site restoration.

### 3.08 MULCH

- A. Used alone or in conjunction with other structural or vegetative erosion control measure, mulch is applied on any disturbed area, which is subject to erosion, for protection of disturbed soil or newly reseeded areas. See table 1.

### 3.09 EROSION CONTROL FABRIC

- A. Erosion control fabric shall be used on slopes greater than 20 percent. Prior to installation of the erosion control fabric, the underlying layer is to be graded and seeded as shown on the drawings. Erosion control fabric shall be staked into place according to manufacturer's instructions.

### 3.10 VEGETATION

- A. Temporary vegetation:
  1. The planting of temporary vegetative cover shall be performed on disturbed areas where the earthmoving activities will be ceased for a period of more than 14 days.
    - A. The vegetation shall provide short-term rapid cover for the control of surface runoff and erosion, until permanent vegetation can be established or earthmoving activities can resume.
  2. The temporary vegetative seed mix is outlined in table 2. Prior to seeding, a copy of the seed composition list including species and percent by weight shall be provided to project ENGINEER.
- B. Permanent vegetation:
  1. Planting of various permanent vegetative covers shall be performed in accordance with the site restoration. See section 02900.
    - A. Permanent plant and seed material shall be installed according to the plant material list, planting plan legend, seed mixes, and details included on the site drawings on the planting plan.

Table 1

Mulch Materials, Rates and Uses

MULCH MATERIAL	QUALITY STANDARDS	APPLICATION PER 1,000 SQ. FT.	RATES PER ACRE	DEPTHS OF APPLICATION
Straw or hay	Air-dried Free from coarse	75-100 lbs. 2-3 bales	1.5-2.5 tons 90-120 bales	Lightly cover 75 to 90% of surface
Wood chips	Green or air-dried	500-900 lbs.	10-20 tons	2" - 7"

Table 2

Temporary Seedings for Erosion Control of Construction Sites

SPECIES	PERCENT BY WEIGHT
Annual rye grass	10%
Creeping red fescue	35%
Little bluestem	35%
Canada wild rye	10%
Perennial rye grass	10%

Apply temporary erosion control seed mix at a rate of 1 lb/1,250 sf.

### 3.11 SPECIAL CONDITIONS

- A. Prohibited construction practices - prohibited construction practices include but shall not be limited to the following:
  1. Dumping of spoil material into any stream corridor, any wetlands, any surface waters or at unspecified locations, even with permission of the property owner.
  2. Indiscriminate, arbitrary or capricious operation of equipment in any stream corridors, any wetlands or any surface waters.
  3. Pumping of silt-laden water from trenches or other excavations into any surface waters, any stream corridors or any wetlands.
  4. Damaging vegetation adjacent to or outside of the access road or the right-of-way.
  5. Disposal of trees, brush and other debris in any stream corridors, any wetlands, any surface water or at unspecified locations.
  6. Permanent or unspecified alteration of the flow line of the stream.
  7. Open burning of construction project debris.
- B. Defective devices - any erosion and sediment control devices, which become damaged, clogged or otherwise non-functional shall be immediately replaced by the contractor, without additional compensation.
- C. Adjustment:
  1. If the planned measures do not result in effective control of erosion and sediment runoff to the satisfaction of the regulatory agencies having jurisdiction over the project, the contractor shall immediately adjust his program and/or institute additional measures so as to eliminate excessive erosion and sediment-runoff.
  2. If the contractor fails or refuses to comply promptly, the owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the contractor.

END OF SECTION

SECTION 01620  
EQUIPMENT-GENERAL

PART 1 GENERAL

1.01 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.

1.02 RELATED SECTIONS

- A. Section 01331 - SHOP DRAWING PROCEDURES.
- B. Section 01640 - TRANSPORTATION AND HANDLING OF MATERIALS AND EQUIPMENT.
- C. Section 01660 - STORAGE OF MATERIAL.
- D. Section 01751 - STARTING AND PLACING EQUIPMENT IN OPERATION.
- E. Section 01781 - OPERATION AND MAINTENANCE DATA.
- F. Section 01821 - INSTRUCTION OF OPERATION AND MAINTENANCE PERSONNEL.

G. Section 05500 - MISCELLANEOUS FABRICATIONS.

H. Section 15170 - MOTORS.

### 1.03 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.

### 1.04 PERFORMANCE AFFIDAVITS

- A. Provide performance affidavits for products listed in the Schedule of Equipment Testing and Manufacturer's Services included at the end of this section and as required in the individual technical sections.
- B. Submit performance affidavits in conformance with Section 01331.
- 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.

### 1.05 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. Electric motor submittals shall be in accordance with Section 15170.
- G. All electrical equipment submittals shall be in accordance with Division 16, Electrical Specifications.

#### 1.06 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.

#### 1.07 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.

#### 1.08 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.

#### 1.09 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 4-inch high housekeeping pads for all mechanical, heating and ventilating, plumbing and electrical equipment. Coordinate with other contractors before 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.



#### 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 but not shown to be installed by the Electrical Contractor.

#### 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 in Section 15170.
  - 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 1.04.

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

(continued)

**SCHEDULE OF EQUIPMENT TESTING AND MANUFACTURER'S SERVICES**

EQUIPMENT ITEM	SPEC. SECTION	PERFOR- MANCE AFFIDAVIT	SHOP TESTS	FIELD TESTS	CERT.	SERVICES OF MFG. REP.				WRITTEN INSTRUC- TIONS
						INSTALLATION DAYS	FINAL ACCEPTANCE DAYS	INSTRUCTIONS DAYS		
Tube Settler System	11201	Yes	Yes	Yes	Yes	1 per tank	1 per tank	1 per tank	1 per tank	Yes
Weir Plates and Accessories	11287	Yes	Yes	Yes	Yes	1 total	0	0	0	Yes
Horizontal Centrifugal Solids Handling Pump	11305	Yes	Yes	Yes	Yes	1 per pump	1 per pump	1 per pump	1 per pump	Yes
Temporary Residuals Dewatering and Disposal Equipment	11315	No	Yes	Yes	Yes	(Note 1)	(Note 1)	(Note 1)	(Note 1)	(Note 1)
Thickened Sludge Pumps	11320	Yes	Yes	Yes	Yes	1 per pump	1 per pump	1 per pump	1 per pump	Yes
Thickener - Clarifier	11335	Yes	Yes	No	No	1 per tank	1 per tank	1 per tank	1 per tank	Yes
Mechanical Mixing	11351	Yes	Yes	Yes	Yes	1 total	1 total	1 total	1 total	Yes
Dewatering Pumps	11325	Yes	Yes	Yes	Yes	1 per system	1 per system	1 per system	1 per system	Yes
Polymer Feed System	11333	Yes	No	Yes	Yes	1 per system	1 per system	1 per system	1 per system	Yes
Belt Filter Press	11350	Yes	No	Yes	Yes	5 per BFP	14 per BFP (Note 2)	5 per BFP	5 per BFP	Yes
Dumpster Conveying Systems	14600	Yes	Yes	Yes	No	1 per system	1 per system	1 per system	1 per system	Yes

Note 1: CONTRACTOR shall provide onsite operations of the temporary residuals dewatering and disposal system during the construction of Building E and Building B upgrades.

Note 2: Each BFP shall run under the supervision of the manufacturer for a period of 2-weeks. Manufacturer shall be onsite during this period.

END OF SECTION

## SECTION 01630

### SUBSTITUTIONS

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. Requests for review of a substitution shall conform to the requirements of the General Conditions and shall contain complete data substantiating compliance of proposed substitution with Contract Documents.

##### 1.02 CONTRACTOR'S OPTIONS

- A. For materials or equipment (hereinafter products) specified only by reference standard, select product meeting that standard, by any manufacturer, fabricator, supplier or distributor (hereinafter manufacturer). To the maximum extent possible, provide products of the same generic kind from a single source.
- B. For products specified by naming several products or manufacturers, select any one of the products or manufacturers named which complies with Specifications.
- C. For products specified by naming one or more products or manufacturers and stating "or equal," submit a request for a substitution for any product or manufacturer, which is not specifically named.
- D. For products specified by naming only one product or manufacturer and followed by words indicating that no substitution is permitted, there is no option and no substitution will be allowed.
- E. Where more than one choice is available as a CONTRACTOR'S option, select product that is compatible with other products already selected or specified.

##### 1.03 SUBSTITUTIONS

- A. During a period of 30 days after date of commencement of Contract Time, ENGINEER will consider written requests from CONTRACTOR for substitution of products or manufacturers, and construction methods (if specified).
  - 1. After end of specified period, requests will be considered only in case of unavailability of product or other conditions beyond control of CONTRACTOR.
- B. Submit five copies of request for substitution. Submit separate request for each substitution. In addition to requirements set forth in Article 6.05 of General Conditions, include in request the following:
  - 1. For products or manufacturers:
    - a. Product identification, including manufacturer's name and address.
    - b. Manufacturer's literature with product description, performance and test data, and reference standards.
    - c. Samples, if appropriate.
    - d. Name and address of similar projects on which product was used, and date of installation.
  - 2. For construction methods (if specified):
    - a. Detailed description of proposed method.
    - b. Drawings illustrating method.

3. Such other data as the ENGINEER may require to establish that the proposed substitution is equal to the product, manufacturer or method specified.
- C. In making request for substitution, CONTRACTOR represents that:
1. CONTRACTOR has investigated proposed substitution, determined that it is equal to or superior in all respects to the product, manufacturer, or method specified.
  2. CONTRACTOR will provide the same or better guarantees or warranties for proposed substitution as for product, manufacturer or method specified.
  3. CONTRACTOR waives all claims for additional costs or extension of time related to proposed substitution that subsequently may become apparent.
- D. A proposed substitution will not be accepted if:
1. Acceptance will require changes in the design concept or a substantial revision of the Contract Documents.
  2. It will delay completion of the Work, or the work of other contractors.
  3. It is indicated or implied on a Shop Drawing and is not accompanied by a formal request for substitution from CONTRACTOR.
- E. If the ENGINEER determines that a proposed substitute is not equal to that specified, CONTRACTOR shall furnish the product, manufacturer or method specified at no additional cost to OWNER.
- F. Approval of a substitution will not relieve CONTRACTOR from the requirement for submission of Shop Drawings as set forth in the Contract Documents.

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

##### 1.01 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.

##### 1.02 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.

### 1.03 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 01650

### STARTING OF SYSTEMS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Starting systems.
- B. Demonstration and instructions.

##### 1.02 RELATED SECTIONS

- A. Section 01010 - SUMMARY OF WORK.
- B. Section 01700 - CONTRACT CLOSEOUT.

##### 1.03 SUBMITTALS

- A. CONTRACTOR shall submit a System Startup Plan for each system for the OWNER/ENGINEER'S approval. The Plan shall include at a minimum equipment involved, required personnel involvement, schedule, and proposed startup methodology.

##### 1.04 STARTING SYSTEMS

- A. Coordinate schedule for start-up of various equipment systems with the OWNER and all other CONTRACTORS involved in the installation and successful completion of the system.
- B. Notify the ENGINEER and OWNER a minimum of seven (7) days prior to start-up of each item.
- C. Verify field testing of equipment within the system is complete.
- D. Execute startup of systems under supervision of applicable personnel (either the personnel of the CONTRACTOR or the personnel of the manufacturer as specified in the individual technical Specification Sections) in strict accordance with the instructions of the manufacturer.
- E. Systems at a minimum shall be cycled through a complete sequence from start to finish, all safety interlocks and controls shall be verified, system capacity and volumes shall be confirmed.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

##### 1.05 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products to the personnel of the OWNER a minimum of four (4) weeks prior to date of Substantial Completion.
- B. Demonstrate new project equipment and instruct the personnel of the OWNER in a classroom type environment by a qualified representative of the manufacturer who is knowledgeable about the project.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season prior to the beginning of the season when the equipment will be utilized.
- D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with the personnel of the OWNER.

- E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at the agreed upon time, at a designated location.
- F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

## SECTION 01660

### STORAGE OF MATERIAL

#### PART 1 GENERAL

##### 1.01 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 remises.
- G. CONTRACTOR shall be fully responsible for loss or damage to stored materials and equipment.
- H. Do not open manufacturers' 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.

##### 1.02 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.
- B. Store the above materials on wood blocking so there is no contact with the ground.

### 1.03 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.

### 1.04 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.

### 1.05 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 01700  
CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Project record documents.
- D. Warranties.
- E. Spare parts and maintenance materials.

1.02 RELATED SECTIONS

- A. Section 01520 - TEMPORARY CONSTRUCTION FACILITIES.
- B. Section 01620 - EQUIPMENT GENERAL.

1.03 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for the review of the ENGINEER.
- B. Provide submittals to the ENGINEER that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.04 FINAL CLEANING

- A. Execute final cleaning prior to final Project assessment.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, and vacuum any carpeted or soft surfaces.
- C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- D. Clean filters of operating equipment.
- E. Clean debris from roofs, gutters, downspouts, and drainage systems.
- F. Clean Site; sweep paved areas, rake clean landscaped surfaces.
- G. Remove waste and surplus materials, rubbish, and construction facilities from the Site.

1.05 PROJECT RECORD DOCUMENTS

- A. Maintain on Site, one set of the following record documents; record actual revisions to the Work:
  - 1. Contract Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed Shop Drawings, product data, and samples.
  - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by OWNER.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and modifications.
- F. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured depths of foundations in relation to finish main floor datum.
  - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  - 4. Field changes of dimensions and detail.
  - 5. Details not on the original Contract Drawings.
- G. Submit documents to the ENGINEER with claim for final Application for Payment.

1.06 WARRANTIES

- A. Provide duplicate notarized copies.
- B. Execute and assemble transferable warranty documents from subcontractors, suppliers, and manufacturers.
- C. Provide Table of Contents and assemble in binder with a durable plastic cover.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance, and extra materials in quantities specified in individual specification sections.
- B. Deliver to the Project Site unless otherwise specified elsewhere; obtain receipt prior to final payment.
- C. Provide O&M Manuals as specified.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

## SECTION 01730

### INSTALLATION DATA

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. This Section describes general requirements for installing products. Additional product installation requirements are included in the Specification Sections

##### 1.02 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.

##### 1.03 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

##### 2.01 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

### 3.01 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 be as noted on the Contract Drawings. 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

##### 1.01 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 02112 - PAVEMENT CUTTING.
  - 3. Divisions 2-17 - Technical Specifications.

##### 1.02 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 perform test pits at existing pipes, valves, etc. as shown on the drawings or directed. Piping installation should reflect the field information obtained by the test pits. The stationing of tees, fittings and valves should be coordinated with the test pit information in order to facilitate construction of the piping and construction of the interconnections.
- E. The CONTRACTOR shall submit to the ENGINEER his proposed interconnection details, procedures and schedules.
- F. 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.
- G. 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.
- H. 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.

- I. Temporary caps shall be watertight and shall remain in place until the actual interconnections are made.
- J. In unpaved areas, all interconnection joints shall remain exposed and tested under operating pressure for a 24-hour period.
- K. If no leaks occur, the exposed interconnection piping can, upon ENGINEER'S authorization, be backfilled.
- L. The CONTRACTOR shall dewater trenches, existing mains, etc. as required to perform the interconnections.
- M. The CONTRACTOR shall submit his detailed procedures for his interconnection sequence to the ENGINEER.
- N. If the CONTRACTOR wishes to propose construction of several interconnections at one time, he shall submit a written, detailed proposal to the ENGINEER.
- O. No work shall begin on the interconnections until the ENGINEER authorizes the work.
- P. Firms performing taps on existing piping shall be acceptable to the OWNER.
- Q. All joints at interconnections shall be mechanically restrained.
- R. New hydrants shall remain bagged in burlap (except for flushing and/or testing) until placed into service.
- S. The interconnections and abandonment items include all costs to comply with permits, regulatory agencies, etc., not included under other bid items.

#### 1.03 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 01735

### CLEANING

#### PART 1 GENERAL

##### 1.01 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.

##### 1.02 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.

##### 1.03 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.

#### 1.04 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 01740

### WARRANTY REQUIREMENTS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. The CONTRACTOR'S minimum requirements for providing a warranty for the Work included in the Contract.

##### 1.02 RELATED SECTIONS

- A. Section 01010 - SUMMARY OF WORK.
- B. Section 01700 - CONTRACT CLOSEOUT.

##### 1.03 REQUIREMENTS

- A. Unless otherwise noted, the CONTRACTOR shall warrant that all materials and equipment be free from defects and operate correctly for a minimum period of two (2) years from date of final payment.
- B. Unless otherwise noted, the CONTRACTOR shall provide the services of a factory-trained serviceperson to provide repair services for all materials and equipment for a minimum period of two (2) years from the date the material and/or equipment is approved by the OWNER as in-place for continuous permanent operation. This service shall include the cost of all replacement parts during the interval.
- C. The CONTRACTOR shall submit all warranty and guarantee information, including a statement of repair services, with the shop drawing submittal.
- D. Refer to warranty requirements outlined in individual equipment specification sections as required.
- E. Complete original warranty forms filled out in OWNER'S name and register with the manufacturer.

#### PART 2 PRODUCTS - NOT USED

#### PART 3 EXECUTION - NOT USED

END OF SECTION



## SECTION 01751

### STARTING AND PLACING EQUIPMENT IN OPERATION

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. Coordinate schedule for start-up of various equipment and systems. Attend coordination meetings convened by ENGINEER.
- B. Notify ENGINEER seven 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.

#### 1.02 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 variperorpitch 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.

#### 1.03 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 Town offices or at the WTP 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.

#### 1.04 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 coagulation basin blowdown water, filter backwash water, thickened sludge, sodium bisulfite (dechlorination chemical), and 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 in accordance with section 17101.
- 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 for the following equipment:
    - a. Temporary Pumping System
    - b. Distribution Box Mixers
    - c. Residuals Pumps – Filter Backwash and Coagulation Basin Blowdown Pumps
    - d. Polymer Feed Systems
    - e. Thickened Sludge Pumps
    - f. Washwater/Filter Backwash Pumps
    - g. Belt Filter Presses
    - h. Dumpster Conveying System
  - 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.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

## SECTION 01780

### RECORD DOCUMENTS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. The CONTRACTORS responsibilities relative to the documentary and record keeping of actual project construction and submittal of said records.

##### 1.02 RELATED SECTIONS

- A. Section 01010 - SUMMARY OF WORK.
- B. Section 01340 - SUBMITTALS AND CORRESPONDENCE PROCEDURES.
- C. Section 01700 - CONTRACT CLOSEOUT.

##### 1.03 DOCUMENTATION

- A. CONTRACTOR shall maintain and provide the ENGINEER with record documents as specified below except where otherwise specified or modified.
- B. Maintenance of Documents:
  - 1. Maintain in clean, dry, legible condition the following: Drawings, Specifications, Addenda, Approved Shop Drawings, Change Orders, other Modifications of Contract, Test Records, Survey Data, Field Orders, and all other documents pertinent to Work of the CONTRACTOR.
  - 2. Provide files and racks for proper storage and easy access. File in accordance with filing format of Uniform Construction Index (UCI).
  - 3. Make documents available at all times for inspection by ENGINEER and OWNER.
  - 4. Record documents shall not be used for any other purpose.
- C. Marking System: Provide colored pencils for marking changes, revisions, additions and deletions, to the record set of Drawings.
- 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. Drawings: Legibly mark to record actual construction including:
    - a. Depths of various elements of foundation in relation to datum.
    - b. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.

- c. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
  - d. Field changes of dimension and detail.
  - e. Changes made by Change Order or Field Order.
  - f. Details not on original Drawings.
- 5. 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. Change made by Change Order or Field Order.
  - c. Other matters not originally specified.
- 6. Shop Drawings: Maintain as record documents and legibly annotate drawings to record changes made after review.

#### 1.04 SUBMITTAL

- A. At completion of Project, deliver paper and pdf copies of the record documents to ENGINEER.
- B. Accompany submittal with transmittal letter containing:
  - 1. Date.
  - 2. Project title and number.
  - 3. Name and address of the CONTRACTOR.
  - 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.

#### PART 2 PRODUCTS - NOT USED

#### PART 3 EXECUTION - NOT USED

END OF SECTION

## SECTION 01781

### OPERATION AND MAINTENANCE DATA

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. Provide operation and maintenance data in the form of instructional manuals for use by the OWNER'S personnel for:
  - 1. All equipment and systems furnished under this Contract.
  - 2. All valves, gates and related accessories furnished under this Contract.
  - 3. All instruments and control devices furnished under this Contract.
  - 4. All electrical gear.
- 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 preparation of the plant operation and maintenance manual. It also includes all data, which must accompany said manual as directed by current regulations of any participating government agency.
    - 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 startup, normal and emergency conditions; regulation and control; and shutdown.
      - 2) Complete, detailed written preventive maintenance instructions as defined below.
      - 3) Recommended spare parts lists and local sources of supply for parts.
      - 4) Written explanations of all safety considerations relating to operation and maintenance procedures.
      - 5) Name, address and phone number of manufacturer, manufacturer's local service representative, and Subcontractor or installer.
      - 6) Copy of all approved Shop Drawings, and copy of warranty bond and service contract as applicable.
  - 2. Preventive Maintenance Instructions:
    - a. 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.
    - b. 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) Lubrication charts.
      - 4) Table of alternative lubricants.
      - 5) Troubleshooting instructions.
      - 6) List of required maintenance tools and equipment.



- C. Submittals:
1. General: Submit operations and maintenance data to the ENGINEER within 30 days prior to either start up or Substantial Completion.
  2. Number of copies: Six of each item including pdf copies.
  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. 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 finder. Provide reinforced punched binder tab. Or provide fly-leaf for each product. All text must be legible typewritten or machine printed originals or high quality copies of same.
    - b. Each page shall have a binding margin of approximately 1-1/2-inches and be punched for placement in a three-ring loose-leaf or triple post binder. Provide binders. Identify each binder with the following:
      - 1) Title "OPERATING AND MAINTENANCE INSTRUCTIONS."
      - 2) Title of project.
      - 3) Identity of building or structure as applicable.
      - 4) Identity of general subject matter covered.
    - d. Use dividers and indexed tabs between major categories of information such as operating instructions, preventive maintenance instructions, or other. When necessary, place each major category in a separate binder.
    - e. Provide a table of contents for each binder.
    - f. 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.
  5. Layout Requirements:
    - a. Part 1 - Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
    - b. Part 2 - Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      - 1) Significant design criteria.
      - 2) List of equipment.
      - 3) Parts list for each component.
      - 4) Operating instructions.
      - 5) Maintenance instructions for equipment and systems.
      - 6) Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
      - 7) List of spare parts, lubricants and other items delivered to Owner.
    - c. Part 3 - Project documents and certificates, including the following:
      - 1) Shop drawings and product data.
      - 2) Air and water balance reports.
      - 3) Performance affidavits
      - 4) Certificates.
      - 5) Photocopies of warranties and bonds.

- D. Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection, with ENGINEER comments. Revise content of documents as required prior to final submittal.
- E. Submit final volumes and electronic copy revised, within 10 days after final inspection.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

## SECTION 01783

### SPARE PARTS AND MAINTENANCE MATERIALS

#### PART 1 GENERAL

##### 1.01 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 3 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.
    - c. 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.
  - b. 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.
  - c. 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.
  - e. ENGINEER.
  - f. 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.

- C. CONTRACTOR shall video-record all training sessions. Provide a video recording of each training session on a single DVD. Provide two duplicate DVDs for each training session and distribute one copy to the OWNER and one to the ENGINEER. Provide computer-generated adhesive labels on each DVD. Label each DVD with the training session description, date training occurred, attendees, trainer, contact information, the equipment covered during the training session, and the project title.

- D. ENGINEER will review their copy for video quality including, but not limited to, picture quality, use of camera angles, and sound recording quality. Video must be clearly audible. If the ENGINEER deems the video or audio quality as poor, the CONTRACTOR shall conduct the training session again (with original attendees present) and re-record the session at no additional cost to the OWNER.

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.
  5. Submit DVD recordings of each training session as described in Article 1.2.
- 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.
  - 4. A video recording shall be done of the training sessions and provided to the OWNER via DVD. Two (2) copies shall be made available for each training sessions.
- 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 table 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 4 hours; sessions longer than 4 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

##### 1.01 SECTION INCLUDES

- A. Removal of designated building equipment and fixtures.
- B. Removal of designated construction.
- C. Disposal of materials.

##### 1.02 RELATED SECTIONS

- A. Section 01520 - TEMPORARY CONSTRUCTION FACILITIES.
- B. Section 01561 - SECURITY.
- C. Section 02820 - ASBESTOS ABATEMENT.
- D. All Division 11 Specifications.
- E. All Division 14 Specifications.

##### 1.03 SUBMITTALS FOR REVIEW

- A. All submittals shall be made in accordance with the General Specifications and the Supplementary Conditions.
- 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 unanticipated interruption of the operations of the OWNER.
- C. Notification
  - 1. At least ten (10) business days prior to commencement of demolition, notify OWNER and ENGINEER in writing of the proposed schedule. Do not commence demolition without the written permission of the OWNER and ENGINEER.

##### 1.04 REGULATORY REQUIREMENTS

- A. Conform to all applicable federal, state, and local laws and codes for asbestos abatement, demolition Work, dust control, and products requiring electrical power removal.
- B. Obtain any required permit(s) from regulatory authorities 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.

- E. Conform to procedures applicable when hazardous or contaminated materials are discovered.
- F. Conform to the requirements of the Supplementary Conditions.

#### 1.05 SEQUENCE OF WORK

- A. The CONTRACTOR shall submit a sequence of work for demolition activities as described in General and Special Project Conditions, and as noted on the Contract Drawings.

#### 1.06 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.

#### 1.07 PROJECT CONDITIONS

- A. Cease operations immediately if the structure appears to be in danger and notify the ENGINEER. Do not resume operations until directed by the ENGINEER.
- B. If the CONTRACTOR believes that the location on which the current structure or apparatus being demolished is contaminated, based on casual visual observation or detection of atypical conditions, operations shall be ceased immediately at that location. The condition shall be brought to the attention of the ENGINEER. If it is determined that there is contamination at this Site, do not continue Work until directed by the ENGINEER.
  - 1. If so directed by the ENGINEER, the CONTRACTOR shall employ a testing lab to take samples for analyses and determination of the hazard. The testing laboratory shall include recommendations pertaining to the potential hazard of the sampled substances. All costs for this Work shall be in addition to the Contract Value.
  - 2. Asbestos containing material is located within the Work area of Building E and Building B. The CONTRACTOR shall comply with asbestos demolition rules and regulations as stated in Article 1.04. Reference Article 4.06 of Supplementary Conditions for reports prepared identifying Hazardous Environmental Conditions.

### PART 2 PRODUCTS - NOT USED

### PART 3 EXECUTION

#### 3.01 PREPARATION

- A. Provide, erect, and maintain temporary barriers and security devices in accordance with this Specification.
- B. Erect and maintain weatherproof closures for exterior openings.
- C. Erect and maintain, as directed by the ENGINEER or as necessary, temporary partitions to prevent spread of dust, odors, and noise to permit continued OWNER occupancy.
- D. Protect existing materials, structures, and equipment that are not to be demolished.

- E. Prevent movement of the structure; provide bracing and shoring. The CONTRACTOR shall take care to prevent any unexpected collapse of existing structures.
- F. Notify affected utility companies before starting Work and comply with their requirements.
- G. Mark the location and termination of all utilities.
- H. Provide appropriate temporary signage including signage for exit or building egress.

### 3.02 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 that 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 that are to remain or to any property belonging to the OWNER or occupants of adjacent facilities.
- L. Perform all Asbestos abatement in accordance with all Federal, State, and Local regulations as listed in Section 02820 Asbestos Abatement and Removal.

### 3.03 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. For any work involving contact with existing soils or removing soils from equipment and materials, comply with the Special Project Conditions.

### 3.04 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, roofing materials, 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 as architecturally finished surfaces shall be repaired and re-finished by the CONTRACTOR. Utilize the same or matching materials as the existing adjacent surface or as otherwise approved by the ENGINEER.
- D. Unless otherwise approved by the ENGINEER, building demolition shall proceed from the top of the structure to the ground. The CONTRACTOR shall complete demolition work above each floor or tier prior to disturbing the supporting members of the lower levels.
  - 1. Demolish concrete and masonry in small sections.
  - 2. Break-up and remove foundations and grind flush to floor, slabs-on-grade, housekeeping pads, pipe supports, dowels, thrust blocks, etc. unless otherwise indicated to remain. All finished surfaces shall be smooth, finished floors.
  - 3. Carefully position demolition equipment so as not to impose excessive loads or undo stress on remaining walls, floors, or framing.
  - 4. Remove demolition refuse immediately so as not to impose excessive loads on floors, walls, or framing.
- E. 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.

### 3.05 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. Piping to be removed shall be purged of any existing materials and made safe prior to removal or capping. The substances drained shall be properly disposed of by the CONTRACTOR. 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/floor.

### 3.06 ELECTRICAL AND INSTRUMENTATION REMOVAL

- A. Electrical removal shall consist of the demolition of existing panel boards, motor control centers, control panels, motors, conduits and wires, exposed ground conductors, 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.
- 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 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.

### 3.07 REFUSE REMOVAL, HANDLING, AND OWNERSHIP

- A. Any item that is to be disconnected and relocated, as indicated on the Contract Drawings (lime metering pumps), shall be carefully removed, so as not to be damaged, and relocated to the location identified in the Contract Drawings.
  - 1. If an item is damaged during relocation, the CONTRACTOR is responsible for the cost of replacing the item.
- 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.
- D. All soils shall be handled, transported, and disposed of in accordance with the Supplemental Conditions.

### 3.08 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.
- 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.

3.09 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 02110

### SITE CLEARING

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Removal of surface debris, rubbish, snow and water without unnecessary excavation of topsoil and subsoil.
- B. Removal of paving, curbs, and walks.
- C. Removal of trees, shrubs, and other plant life.
- D. Removal of stumps and root system of trees and shrubs.
- E. Disposal of excess materials, trash, and debris.
- F. Topsoil excavation and stockpile reusable topsoil for later use.

##### 1.02 RELATED SECTIONS

- A. Section 01562 - PROTECTION OF WORK AND PROPERTY.
- B. Section 01520 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS.
- C. Section 02205 - PROTECTION OF EXISTING FACILITIES.
- D. Section 02351 - EXCAVATION, BACKFILL AND TRENCHING.

##### 1.03 REGULATORY AND DISPOSAL REQUIREMENTS

- A. Coordinate clearing Work with utility companies.
- B. Conform to applicable local, state and county codes for environmental requirements, disposal of debris, burning debris on site, stockpiling and the use of herbicides.
- C. On-site disposal of surplus materials, if permitted by the OWNER, shall be as approved by the ENGINEER.
- D. Make all arrangements for disposal sites, unless the OWNER designates special locations. All expenses for disposal shall be borne by the CONTRACTOR. Bidders shall carefully investigate all aspects of surplus material disposing operations.
- E. Prior to depositing surplus material at any off-site location, obtain a written agreement between CONTRACTOR and the owner of the property on which the disposal of the material is proposed. The agreement shall state that the owner of the property gives permission for the CONTRACTOR to enter and deposit material of a particular classification on the owner's property at no expense to the project OWNER, and shall include any other conditions pertinent to the situation as agreed upon by each party. A copy of said agreement shall be furnished to the OWNER.
- F. Follow standard horticultural practice for cutting and/or pruning of trees, brush, and shrubs.



PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that existing plant life designated to remain is tagged or identified.
- B. Mark limits of clearing by flagging, fencing or other approved methods.
- C. Vehicles used to haul soft or wet material over streets or pavements shall be sufficiently watertight to prevent deposits on the streets or pavements. In all cases where any materials are dropped from the vehicles of the CONTRACTOR, he shall clean up the same, and keep the crosswalks, street and pavements clean and free from debris.
- D. Identify on-site waste or salvage areas for placing removed materials.

3.02 PROTECTION

- A. Locate, identify, and protect existing utilities that are to remain, including notification of underground facilities protection organizations having jurisdiction in the geographic area (Dig Safely New York).
- B. Install temporary fences (minimum 3 feet high) to protect trees, plant growth, and features designated to remain, as final landscaping.
- C. Protect benchmarks, survey control points and existing structures from damage or displacement.
- D. Where trees are to be protected or preserved, no excavation and grubbing, except as directly required for construction, shall be performed within the radius of spread of tree branches.
- E. No storage of topsoil materials or construction equipment will be permitted within the radius of spread of such tree branches.

3.03 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove paving, curbs, and walks as necessary within the limits of work shown on the Drawings.
- C. Remove trees and shrubs within marked areas. Remove stumps, main root ball and surface rock.
- D. Clear undergrowth and deadwood, without disturbing subsoil.
- E. Apply herbicide to remaining stumps to inhibit growth.
- F. Remove debris, extracted rock, and plant life.
- G. Prune branches and/or roots of trees to be preserved or where they interfere with or obstruct construction operations.
  - 1. If exposed, bend and relocate main lateral roots and tap roots.
  - 2. Engage a state-certified arborist or qualified tree surgeon who shall cut roots and/or branches with sharp pruning instruments without breaking or chopping.

3. Qualified personnel shall paint all cuts with standard tree paint or equivalent, which is waterproof, antiseptic, elastic and free of kerosene, coal, tar, creosote, and other harmful substances.
  4. Where required, extend pruning procedures to restore the natural shape of the entire tree or shrub.
- H. Damaged Trees - Vegetation which has been damaged by site clearing activities and deemed non-functional by the OWNER or ENGINEER, shall be replaced by the CONTRACTOR with vegetation of the same genus and species at CONTRACTOR's expense.

3.04 DISPOSAL OF MATERIAL

- A. All material shall be treated as surplus material and disposed of off-site in a legal manner per Article 1.03.

3.05 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated re-landscaped or regraded without mixing with foreign materials.
- B. All topsoil, loam, or other natural organic materials covering such areas shall be removed, and when suitable for reuse as topsoil shall be stockpiled. Stockpiles shall be established only at approved locations and shall be maintained to prevent erosion and contamination until reuse. To prevent intermixing, topsoil shall not be stockpiled immediately adjacent to other stockpiled materials.
- C. All excavated materials shall be stockpiled at locations, which will not create public endangerment or inconvenience. Stockpiles shall be kept clear from equipment and, where possible, clear of driveways, sidewalks, and crossings.
- D. Protect from erosion. Remove excess topsoil not being reused to a location designated by OWNER.
- E. No topsoil shall be removed from the site without OWNER's permission.

END OF SECTION

SECTION 02112  
PAVEMENT CUTTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pavement cutting.
- B. Pavement scoring.
- C. Pavement (concrete) breaking.
- D. Pavement grinding.
- E. Pavement removal and disposal.

1.02 REFERENCES

- A. NYSDOT - Manual of Uniform Traffic Control Devices.

1.03 RELATED SECTIONS

- A. Section 01562 - PROTECTION OF WORK AND PROPERTY.
- B. Section 02110 - SITE CLEARING.
- C. Section 02351 - EXCAVATION, BACKFILL AND TRENCHING.
- D. Section 02900 - RESTORATION.

1.04 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 02110 for requirements of disposal of surplus material.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 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. Set up barricades, warning signs and traffic direction information prior to start of pavement cutting.
- C. Provide flagmen to direct traffic.

### 3.02 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.

### 3.03 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 02205

### PROTECTION OF EXISTING FACILITIES

#### PART 1 GENERAL

##### 1.01 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.

##### 1.02 RELATED SECTIONS

- A. Section 01201 - PRECONSTRUCTION CONFERENCE.
- B. Section 01562 - PROTECTION OF WORK AND PROPERTY.
- C. Section 02351 - EXCAVATION, BACKFILL AND TRENCHING.

#### PART 2 PRODUCTS - NOT USED

#### PART 3 EXECUTION

##### 3.01 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.

### 3.02 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.

### 3.03 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.

### 3.04 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.

### 3.05 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.

### 3.06 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 workday. Existing sanitary sewer laterals crossing over new pipelines to be restored in accordance with details shown on the Drawings.
- C. 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.

### 3.07 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.

3.08 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.

3.09 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 02228

### COMPACTION

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Compaction requirements and test methods.
- B. Compact all subgrades, foundations, embankments, trench backfills, filled and backfilled material as specified.

##### 1.02 RELATED SECTIONS

- A. Section 01400 - QUALITY CONTROL.
- B. Section 02351 - EXCAVATION, BACKFILL AND TRENCHING.

##### 1.03 REFERENCES

ASTM D698	Laboratory Compaction of Soil Using Standard Effort
ASTM D1556	Density of Soil in Place by the Sand-Cone Method
ASTM D1557	Laboratory Compaction of Soil Using Modified Effort
ASTM D2922	Density of Soil in Place by Nuclear Methods
ASTM D3017	Water Content of Soil in Place by Nuclear Methods

##### 1.04 SUBMITTAL

- A. Submit in writing a description of the equipment and methods proposed to be used for compaction.

##### 1.05 QUALITY ASSURANCE

- A. The CONTRACTOR shall adopt compaction methods, which will produce the degree of compaction specified herein, prevent subsequent settlement, and provide adequate support for the surface treatment, pavement, structure and piping to be placed thereon, or therein, without damage to the new or existing facilities.
- B. The natural subgrade for all footing, mats, slabs-on-grade for structures or pipes shall consist of firm undisturbed natural soil, at the grades shown on the Drawings.
- C. After excavation to subgrade is completed, the subgrade shall be compacted if it consists of loose granular soil or if its surface is disturbed by the teeth of excavating equipment.
  - 1. This compaction shall be limited to that required to compact loose surface material and shall be terminated in the event that it causes disturbance to underlying fine-grained soils, as revealed by weaving or deflection of the subgrade under the compaction equipment.
  - 2. If the subgrade soils consist of saturated fine or silty sands, silts, or clay or varved clays, no compaction shall be applied.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Materials to be compacted shall be as specified in Section 02351.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine spaces to be filled beforehand and remove all unsuitable materials and debris including sheeting, forms, trash, stumps, plant life, etc.
- B. Inspect backfill and fill materials beforehand and remove all roots, vegetation, organic matter, or other foreign debris. Stones larger than 12 inches in any dimension shall also be removed or broken into smaller pieces.
- C. No backfill or fill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments.
- D. Spaces to be filled shall be free from standing water so that placement and compaction of the fill materials can be accomplished in “dry” conditions.

### 3.02 PREPARATION

- A. Brace walls and slabs of structures to support surcharge loads and construction loads imposed by compaction operations.
- B. Proof-roll all subgrade surfaces to accept fill material.
- C. Each layer of fill shall be compacted to the specified density the same day it is placed.
  - 1. The moisture content of backfill or fill material shall be adjusted, if necessary to achieve the required degree of compaction.
- D. Compact each lift in accordance with Table 1.
- E. Match compaction equipment and methods to the material and location being compacted in order to obtain specified compaction, with consideration of the following guidelines:
  - 1. Rubber-tired rollers are preferred for most areas to prevent bridging of softer materials.
  - 2. Double smooth drum rollers may be used provided that careful inspection can prevent bridging.
  - 3. Compaction roller should be lighter in weight than proof-rolling equipment, with a minimum compaction force of 350 pounds per linear inch (PLI).
  - 4. Vibratory compaction is preferred for dry, granular materials.
  - 5. Hand compaction equipment such as impact rammers, plate or small drum vibrators, or pneumatic buttonhead compactors should be used in confined areas.
  - 6. Hydraulic compaction by pounding or jetting will not be permitted except in unusual conditions, and then only upon written approval by the ENGINEER and after a demonstration of effectiveness.

7. Backhoe mounted hydraulic or vibratory tampers are preferred for compaction of backfill in trenches under pavements over 4 feet in depth. The upper 4 feet shall be compacted as detailed above or with hand-guided or self-propelled vibratory compactors or static roller.
8. For plastic pipelines (PVC, PE or PB) do not compact directly over center of pipe until backfill has reached 2 feet above top of pipe.

TABLE 1

**COMPACTION REQUIREMENTS**

CONSTRUCTION ELEMENT	MAXIMUM COMPACTION LAYER THICKNESS (INCHES)	ASTM	MINIMUM COMPACTION
<b>I. STRUCTURES</b>			
a. Fill beneath foundation elements and under slabs-on-grade - hand-guided compaction	6	D1557	95%
Fill beneath foundation elements and under slabs-on-grade - self-propelled or tractor-drawn compaction	8	D1557	95%
b. Fill around structures and above footings	8	D1557	95%
<b>II. TRENCHES**</b>			
a. Fill under pipelines and pipe bedding	8	D1557	95%
b. Pipe sidefills and top 4 feet of pipe backfill under pavements	12	D1557	93%
c. Backfill below 4 feet under pavement	18	D1557	90%
d. Backfill under lawns, gardens and cultivated fields	24	D1557	90%
e. All other trenches***	36	D698	85%
<b>III. EMBANKMENTS AND FILLS</b>			
a. Fill under streets, parking lots, and other paved areas	12	D1557	92%
b. Embankments not supporting pavement or structures	18	D1557	90%
c. Rough site grading	24	D698	85%

\* Where structural loads are carried by piles, caissons or other deep foundations, minimum compaction may be reduced to 92 percent.

\*\* The first 1 foot above pipelines shall have a compacted thickness of 12 inches.

\*\*\* For cross-country pipelines, lifts may be compacted with a backhoe bucket or other means, and slightly mounded at the surface provided that regrading is performed within the guarantee period.

### 3.03 FIELD QUALITY CONTROL

#### A. Material Testing

1. The ENGINEER reserves the right to order testing of materials at any time during the work.
2. Testing will be done by a qualified, independent testing laboratory in accordance with this Section and Section 01400.
3. The CONTRACTOR shall aid the ENGINEER in obtaining representative material samples to be used in testing.

4. For each material, which does not meet specifications, the CONTRACTOR shall reimburse the OWNER for the cost of the test and shall supply an equal quantity of acceptable material, at no additional compensation.
5. The CONTRACTOR shall anticipate these tests and incorporate the time and effort into procedure.

B. Compaction Testing

1. The ENGINEER reserves the right to order the qualified independent testing laboratory to conduct in-place density tests of compacted lifts at the cost to the CONTRACTOR.
2. Testing shall be conducted for every 100 linear feet of trench backfill placed.
3. The CONTRACTOR shall dig test holes and provide access to all backfill areas at no additional compensation when requested by the ENGINEER.
4. For each test, which does not meet specifications, the CONTRACTOR shall retest at his cost. If the retest does not meet specifications, the CONTRACTOR shall replace and recompact material to the specifications at no additional cost to the OWNER.
5. The CONTRACTOR shall anticipate these tests and incorporate the time and effort into procedures.
6. Nuclear moisture density testing by “probe” methods will be acceptable for compacted layers not exceeding 8 inches in thickness.
  - a. Nuclear “backscatter” methods will be acceptable only for testing asphalt paving layers not in excess of 3 inches in thickness.
  - b. Only certified personnel will conduct nuclear testing.
  - c. If the nuclear method is utilized, the results shall be checked by at least one in-place density test method described above.

C. Unacceptable Stockpiled Material - Stockpiled material may be tested according to Material Testing Materials.

D. Alternate Methods of Compaction - The CONTRACTOR may employ alternate methods of compaction if the desired degree of compaction can be successfully demonstrated to the ENGINEER’s satisfaction.

E. Select Material – On Site

1. Any on-site material may be used for select fill material provided it meets all the requirements of the equivalent off-site material.
2. No on-site material shall be used without prior approval of the ENGINEER.

F. Systematic Compaction - Compaction shall be done systematically, and no consideration shall be given to incidental coverage due to construction vehicle traffic.

3.04 PROTECTION

- A. Prior to terminating work for the day, the final layer of compacted fill, after compaction, shall be rolled with a smooth-wheel roller if necessary to eliminate ridges of soil left by tractors or equipment used for compaction or installing the material.

- B. As backfill progresses, the surface shall be graded so as to drain off during incidence of rain such that no ponding of water shall occur on the surface of the fill.
- C. The CONTRACTOR shall not place a layer of fill on snow, ice or soil that was permitted to freeze prior to compaction.
  - 1. These unsatisfactory materials shall be removed prior to fill placement.

END OF SECTION

## SECTION 02316

### SELECT GRANULAR MATERIALS

#### PART 1 GENERAL

##### 1.01 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 02110 - SITE CLEARING.
  - 2. Section 02351 - EXCAVATION, BACKFILL AND TRENCHING.
  - 3. Section 02900 - RESTORATION.

##### 1.02 QUALITY ASSURANCE

- A. Reference Standards - NYSDOT Standards, latest revision.

##### 1.03 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

##### 2.01 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:

<u>% Passing</u>	<u>Sieve</u>
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:

<u>% Passing</u>	<u>Sieve</u>
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:

<u>% Passing</u>	<u>Sieve</u>
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:

<u>% Passing</u>	<u>Sieve</u>
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:

<u>% Passing</u>	<u>Sieve</u>
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 only be used for abandonment of buried piping as indicated on the Contract Drawings, and with the OWNER's or ENGINEER's approval. Flowable fill material shall conform to the following:
1. Flowable fill shall consist of a mixture of Portland cement, fly ash, mineral filler, water and admixtures proportioned to provide a non-segregating, free-flowing, self-consolidating material that will result in a hardened, dense backfill.

2. The component materials of the flowable fill shall meet the following specifications:

Cement	NYSDOT Section 701-01, Type 5
Fly Ash	NYSDOT Section 711-10
Water	NYSDOT Section 712-01
Mineral Filler	NYSDOT Section 703-01
Admixtures	NYSDOT Section 711-08

### PART 3 EXECUTION

#### 3.01 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.

#### 3.02 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 02351

### EXCAVATION, BACKFILL AND TRENCHING

#### PART 1 GENERAL

##### 1.01 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 Work Specified Elsewhere
  - 1. Section 01562 - PROTECTION OF THE WORK AND PROPERTY.
  - 2. Section 01564 - EROSION CONTROL.
  - 2. Section 02110 - SITE CLEARING.
  - 3. Section 02205 - PROTECTION OF EXISTING FACILITIES.
  - 4. Section 02228 - COMPACTION.
  - 5. Section 02316 - SELECT GRANULAR MATERIALS.
  - 6. Section 02900 - RESTORATION.

##### 1.02 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.

##### 1.03 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. Sheet piling, shoring and bracing.
  - 2. Dewatering systems.
  - 3. Additional excavation protection systems required.

- 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.

#### 1.04 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

#### 2.01 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.

## PART 3 EXECUTION

### 3.01 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.

### 3.02 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.

### 3.03 EROSION CONTROL

- A. See Specification Section 01564.

### 3.04 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.
- B. "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. Where the excavation is in rock meeting the definition (requiring drilling, jackhammering and hand removal), the rock shall be removed as follows:
  - 1. Rock removal by blasting methods is not permitted
  - 2. Allow time for Engineer to take site measurements of rock quantities to be removed. Assist the Engineer with the measurements, if requested.
  - 3. Cut away rock at bottom of excavation to form level bearing surface for foundations of buildings and structures.
  - 4. Remove shale layers to provide sound and unshattered base for pipe bedding.
  - 5. In utility trenches, trim rock to 4 inches below bottom of installed pipe and 12 inches wider than outside diameter of installed pipe.
  - 6. Remove excavated materials from site and reuse for site backfill and/or landscaping as approved.
  - 7. Provide for Engineer's inspection of foundation bearing surfaces and cavities formed by removed rock.
- C. 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.

- D. 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.
- E. 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.
- F. 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.
- G. 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.
- H. 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.
- I. 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.
- J. 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.

### 3.05 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.

### 3.06 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.

### 3.07 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 residences, 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.
- D. 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.

### 3.08 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 shall be in accordance with Section 02228. 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. 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.
    - 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. 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 and in Section 02228.
  - 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 Section 02228.
  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.

### 3.09 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 02510

### ASPHALT CONCRETE PAVING

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Asphalt concrete paving and surface sealer; wearing, top course, binder, or base course.
- B. Driveways and parking areas.
- C. Road shoulders.
- D. Compaction.
- E. Tolerances.
- F. Field quality control.

##### 1.02 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Section 02734 - Sanitary Sewer Manholes.

##### 1.03 RELATED SECTIONS

- A. Section 01202 - PROGRESS MEETINGS.
- B. Section 01310 - PROJECT COORDINATION.
- C. Section 01331 - SHOP DRAWING PROCEDURES.
- D. Section 02112 - PAVEMENT CUTTING.
- E. Section 02228 - COMPACTION.
- F. Section 02351 - EXCAVATION, BACKFILLING AND TRENCHING.

##### 1.04 REFERENCES

- A. New York State Department of Transportation (NYSDOT) Standard Specifications, dated January 2, 1990.
- B. NYSDOT - Manual of Uniform Traffic Control Devices.

##### 1.05 PERFORMANCE REQUIREMENTS

- A. Paving and repaving accomplished under this contract shall meet the finished grades, elevations and profiles shown on the Drawings.
  - 1. Where pavement replacement is being accomplished, match the sectional profiles of the existing pavement unless otherwise stated herein or shown on the Drawings.
- B. All thicknesses of pavement courses described herein or shown on the Drawings are after completion of compaction.

1.06 SUBMITTALS

- A. Submit under provisions of Section 01331.
- B. Submit certification of plant job mix formulas that have been approved by the NYSDOT.
- C. Traffic control plan in accordance with the Manual of Uniform Traffic Control.

1.07 PROJECT RECORDS

- A. Submit Marshall Test reports of asphalt concrete.

1.08 QUALITY ASSURANCE

- A. Perform work in accordance with the NYSDOT Standard Specifications, dated January 2, 1990 as amended to date and as they apply to the following:
  - 1. Materials and batch plant requirements.
  - 2. Construction procedures except as modified herein.
  - 3. Weather and seasonal limitations except as modified herein.
- B. Paving work shall be performed by a qualified paving contractor or subcontractor acceptable to the Owner and Engineer.
- C. Obtain asphalt concrete materials from same source throughout project.

1.09 ENVIRONMENTAL LIMITATIONS

- A. Weather and Seasonal Limitations - Asphalt concrete and bituminous surface treatments shall not be placed on wet surfaces or when it is raining or when conditions prevent the proper handling, compacting or finishing of the asphalt concrete or when the surface temperature is less than specified in the following table:

NOMINAL COMPACTED LIFT THICKNESS	SURFACE TEMPERATURE MINIMUM (NOTE 1)	SEASONAL LIMITS
3" or greater	40°F	None
Greater than 1" but less than 3"	45°F	(Notes 2 and 3)
0.1" or less	50°F	(Notes 2 & 3)
Bituminous surface treatments (Note 3)	70°F or greater	(Note 4)

NOTES:

- 1. All temperatures shall be measured on the surfaces (lay glass thermometer on surface and read after temperature has stabilized) where the paving is to be placed and the controlling temperature shall be the average of three temperature readings taken at locations  $\pm 25$  feet apart.
- 2. Top course shall be placed only during the period of May 1 to October 15 in all counties except Dutchess, Orange, Rockland, Putnam, Westchester, Nassau, Suffolk, and the City of New York in which top course shall be placed only during the period of April 1 to November 15. [In addition, when top course is placed between September 15 and November 15, not less than two rollers shall be furnished and operated by the Contractor.]
- 3. Surface treatments shall be placed during the period of May 1 up to and including the first Saturday after Labor Day.

4. The ambient temperature shall be not less than 50 degrees F in the shade and not more than 95 degrees F.
5. Bituminous paving mixtures for curbs, driveways, sidewalks, gutters and other incidental construction shall be placed on surfaces having a temperature of 45 degrees F or greater. Installation of these items is not subject to seasonal limitations.
6. When work is halted because of weather conditions, limited tonnage enroute to the Project may be placed, if permitted, and the mixture is within the temperature requirements.

#### 1.10 SCHEDULING

- A. Schedule the paving operations such that all paving necessary to provide safe and adequate maintenance and protection of traffic or for protection of previously laid courses is completed within the weather and seasonal limitations.
  1. Such scheduling shall include expediting construction operations to permit paving before the seasonal limitations or by limiting the length of work to that which can be completed before the seasonal shutdown.
  2. The cost of scheduling and sequencing of work to conform with the seasonal limitations shall be reflected in the bid prices for the related contract items.

#### 1.11 MAINTENANCE

- A. The Contractor shall maintain driving surfaces, free of ruts and potholes, for maintenance of traffic until temporary paving or permanent paving is installed.
  1. All temporary paving and pavement replacement shall be maintained in a safe, drivable condition until the pavement wearing course is installed.
  2. All subgrade, subbase and base courses shall also be maintained in their specific finish condition prior to placement of the next course.
- B. If the Contractor fails to complete the necessary paving operations prior to weather and seasonal limitations, all temporary materials and work which become necessary as a result of such failure, such as the lowering or shimming of castings and protrusions, drainage of the roadway, providing acceptable rideability, and other work needed for the adequate maintenance and protection of traffic until paving operations can be completed the following paving season, shall be at the Contractor's expense.
- C. For a period of one year after issuance of the Certificate of Substantial Completion, the Contractor shall promptly patch, maintain, repair, and/or replace any pavement that settles or becomes damaged due to settlement or defective materials or workmanship.
  1. Areas to be repaired shall be cut out in a square or rectangular shape to the depth matching the top course.
  2. The vertical face of asphalt to be painted with asphalt emulsion prior to placing the asphalt concrete.
  3. If more than top course depth of 1-1/2 inch settlement has occurred, the pavement shall be removed to the subbase and subbase and/or binder and base course restored to proper grade before restoration of the wearing course.
  4. The centerline finished grade, in any case, shall be as shown on the Contract Drawings.

## PART 2 PRODUCTS

### 2.01 ASPHALT CONCRETE (NEW YORK)

- A. Base Course - The pavement base course shall be constructed of one of the two types described below and as shown on the Drawings. Base course material shall be installed to a width and depth as shown on the Drawings.
  - 1. Type 2, Asphalt Concrete - This base course shall be NYSDOT Type 2, per NYSDOT Table 401-1. Final compacted thickness shall be as shown on the Drawings but not less than 3 inches. Temperature range from 225 degrees F to 300 degrees F.
- B. Binder Course - The pavement binder course shall be constructed of the type described below and as shown on the Drawings. Binder course material shall be laid to a width and depth shown on the Drawings. Temperature range 250 degrees F to 325 degrees F.
  - 1. Type 3, Asphalt Concrete - This binder course shall be NYSDOT Type 3, per NYSDOT Table 401-1. Final compacted thickness shall be as shown on the Drawings, but not less than 2 inches.
- C. Shim-Course (Trueing and Leveling) - The shim course shall be constructed of one of two types described below and in the NYSDOT Standard Specifications, Table 401-1. Temperature range 250 degrees F to 325 degrees F.
  - 1. Type 3, Asphalt Concrete - This shim course shall be NYSDOT Type 3 for compacted thickness required over 1-1/2 inches in depth.
- D. Pavement Wearing Course (Top Course) - Pavement wearing course construction shall be one of the four types described below and as shown on the Drawings. The wearing course shall be constructed to a width and depth as shown on the Drawings.
  - 1. Type 7, Asphalt Concrete - This wearing course shall be NYSDOT Type 7 and/or Type 7F, per NYSDOT Table 401-1. Final compacted thickness shall be as shown on the Drawings, but not less than 1 inch. (The "F" designation indicates that high friction course aggregates are required.) Temperature range from 250 degrees F to 325 degrees F.
- E. Surface Treatment - Surface treatment of paved or unpaved areas shall be one of the types described below, and as shown on the Drawings. Aggregates, bituminous material and constructor details shall comply with NYSDOT Standard Specification 410.
  - 1. Type M, Bituminous Surface Treatment (Single Course for Pavement) - This surface treatment shall be constructed as specified in NYSDOT Standard Specification Section 410.
  - 2. Type N, Bituminous Surface Treatment (Double Course Pavement) - This surface treatment shall be constructed as specified in NYSDOT Standard Specification Section 410.
  - 3. Type O, Bituminous Surface Treatment (Single Course for Shoulders) - This surface treatment shall be constructed as specified in NYSDOT Standard Specification Section 410, Part 410-3.02.
- F. Tack Coat
  - 1. NYSDOT - Tack coats of asphalt emulsions, Type 702-6, Table 702-9, shall be furnished and applied in accordance with NYSDOT Specification Section "407 - Tack Coat." Prior to placing the next course, the asphalt shall be allowed to cure per manufacturer's recommendations.

- G. Painted Traffic Markings - Contractor shall replace all markings in accordance with local, county, or state specifications (depending on jurisdiction).

## 2.02 GEOTEXTILE FABRICS - REINFORCED ASPHALT CONCRETE OVERLAYS

- A. Geotextile fabric shall be a non-woven polypropylene or polyester fabric especially manufactured and treated for this use. It shall be Mirafi 900N, Philips Petromat, Trevira S1115 or equal.

## 2.03 SOURCE QUALITY CONTROL

- A. Provide certification of state approved job mix formulas for types to be used on this project.

# PART 3 EXECUTION

## 3.01 EXAMINATION

- A. Permanent restoration of pavements shall not begin until 30 days after trench or structure backfill has been completed in accordance with the applicable specifications or until testing of the installed utility has been completed in accordance with the specifications (whichever is the longest period of time after completion of trench or structural backfill).
  - 1. Completion of backfill shall include compaction tests to ascertain compliance with degree of compaction required as described in Section 02351.
    - a. Verify base conditions under provisions of Section 01039.
    - b. Verify that compacted subgrade is dry and ready to support paving.
    - c. Verify gradients and elevations of base are correct.
- B. If painted traffic markings on the pavement are to be interrupted by the new pavement replacement, they are to be restored using an approved traffic paint.
- C. Driveway and Parking Areas
  - 1. Driveways and parking areas that are disturbed or damaged by the Contractor's operations shall be restored equal to a new condition.
  - 2. Driveway or parking area aprons which do not meet the elevation of the edge of new road pavement installed under this project shall be adjusted to meet the new pavement at a slope not to exceed 1 inch per foot with top course material of the new pavement, so that the apron conforms to the elevation of the road pavement at each location.
  - 3. New driveways or parking areas shall be constructed as described herein and as shown on the Drawings.
- D. Road shoulders to be constructed or reconstructed as described herein and as shown on the Drawings.
  - 1. Road shoulders that are disturbed or damaged by the Contractor's operations shall be restored equal to, or to conditions superior to that which existed prior to construction.
  - 2. Road shoulders that do not meet the elevation of the edge of new road pavement installed under this project shall be adjusted to meet the new pavement at a slope not to exceed 1-1/2 inches per foot. Paving materials shall match existing unless otherwise shown on the Drawings.

3. New road shoulders shall be constructed as described herein and as shown on the Drawings.

### 3.02 PREPARATION

- A. Where project consists of reconstructing existing streets, lower valve boxes and existing manholes to subgrade level by removing frame and cover and brick masonry.
  1. Cover valve boxes and manholes with steel plates and locate with measured ties.
  2. After constructing the subbases and pavement courses, and prior to placing the final top course, recover valve boxes and manholes and raise to finished grade.
- B. All existing and new manholes, frames and covers, valve boxes, curb boxes, etc., shall be raised or lowered to be 1/2 inch below the new pavement grade.
  1. No manhole covers or valve box covers shall be covered with paving material or be exposed in a depression in the pavement greater than 1/2 inch.
- C. Catch basin frames and grates shall be raised or lowered to be 1 inch below the new pavement finished grade.
- D. Pavement Cuts
  1. Pavement cuts for final pavement replacement shall be made as described herein and in Section 02112.
  2. Pavement cuts shall be made parallel to the centerline of the trench, shall be located 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.
  3. Where a full street width overlay is to be installed the cutbacks may follow the backfilled trench alignment.
  4. 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.
  5. Pavement cuts in driveways shall be cut back 12 inches and made in a straight alignment perpendicular or parallel to the driveway and for its full width.
  6. Pavement cuts in parking areas shall be cut back 12 inches and made in a straight alignment parallel to the centerline of trench.
- E. Preparation of Existing Surfaces
  1. Prior to placing of asphalt concrete, the existing pavement surfaces shall be cleaned including brooming, mechanical sweeping, and flushing with water such that no dust or foreign material remains on the existing surface and in accordance with NYSDOT Specification "401-3.07 Conditioning of Existing Surface" and "633-3.01 Cleaning Existing Pavement and/or Shoulders."
  2. After cleaning of surface, all unsealed or inadequately sealed cracks and joints shall be cleaned with compressed air and then sealed as required under NYSDOT Specification "633-3.02 Cleaning, Sealing and Filling Joints and Cracks."



3. Prior to placing of asphalt concrete, vertical faces of existing pavement, structures, curbs and gutters shall receive a tack coat as described in NYSDOT Specification "407 Tack Coat." Curbs and gutter faces to be sprayed only to the extent to be covered by the asphalt concrete.
- F. All new pavement where meeting existing pavement shall be butted up against a vertical face in the existing pavement.
1. This vertical face to be cut to the depth of the new pavement.
  2. Where the new pavement is an overlay, the beginning and end of the top course shall be similarly butted against a vertical face.
  3. The existing pavement shall be removed for a minimum length of 2 feet, as measured parallel to the direction of paving, or greater if required to eliminate any noticeable bump or to provide adequate drainage away from structures, and to the width of new pavement.
- G. Removal of Existing Pavement
1. Where shown on the Contract Drawings, the Contractor shall remove a portion of an existing pavement including Portland Cement concrete paving, asphalt concrete pavement, or to remove an asphalt concrete overlay pavement from a Portland cement concrete pavement base course, to the limits and profile specified by grinding, milling, or planing methods.
  2. This process shall yield a base upon which a final pavement course will be applied.
  3. The Contractor shall employ equipment especially designed and manufactured for the grinding, milling or planing of pavements.
  4. In general, grinding machines are designed for removing and profiling Portland Cement concrete pavement surfaces while milling and planing machines are designed for the removing of asphalt concrete pavement surfaces.
- H. The resulting ground, milled, or planed surface shall be thoroughly cleaned and free from dust, loose pavement material or other material.
1. The surface shall be free from gouges, large cracks and unsound, soft or broken-up areas.
  2. Gouges shall be made level and true by the use of a trueing and leveling course of asphalt concrete if allowed by the Engineer.
  3. Cracks greater than 1/4-inch shall be cleaned and filled in accordance with Article 3.02.
  4. Unsound, soft or broken-up areas shall be excavated and repaired in accordance with Section 02576 of these Specifications.
  5. Asphalt concrete removed by these processes shall become the property of the Owner and be stockpiled at a location required by the Owner for subsequent recycling.

### 3.03 PREPARATION - RESET MANHOLE FRAMES

- A. Prior to placing wearing (top) course, make final adjustments of manhole frames, catch basin frames, valve boxes and any other utility structures located in the pavement in relation to finished grade.
1. Manhole frames, valve boxes, etc. to set 1/2 inch below finished grade and parallel to finished crown.

2. Catch basin frames to set 1 inch below finished grade and parallel to finished crown.
  - a. Bevel slope of wearing course (for 6-inch width) around catch basin frame.

### 3.04 INSTALLATION

- A. Install Work in accordance with State Department of Transportation standards.
- B. Place asphalt within four hours of applying primer or tack coat.
- C. Compact pavement by rolling. Do not displace or extrude pavement from position. Hand compact with vibratory pans and hand tamps in area inaccessible to rolling equipment.
- D. Develop rolling with consecutive passes to achieve even and smooth finish, without roller marks.

### 3.05 PLACING AND COMPACTING

- A. Placing mix in an appropriate ambient temperature and on a surface sufficiently warm to minimize the risk of excessive cooling before completion of rolling is of paramount importance. Holding the aggregate particles in place is solely the function of the film of asphalt. The asphalt cannot perform this function properly if the mix is too cool when rolled.
  1. A thin course compresses very little under the roller and, as it cools quickly, it must be rolled as soon as possible.
  2. The Contractor shall supply sufficient number of rollers to perform the required compaction while asphalt concrete is still hot and in a workable condition and coordinate speed of paver with rollers such that the degree of compaction required is obtained.
  3. A high degree of densification is not the goal with this type of mix -- the aim is firm seating and contact of the aggregate particles.
  4. One or two coverages (see Table 1) with a steel-wheeled roller weighing 8 to 10 tons is sufficient. Additional rolling may be excessive, causing a break in the bond of asphalt between aggregate particles, particularly after the mix has cooled.
  5. When overtaken by sudden storms, the Engineer may permit work to continue up to the amount which may be in transit from the plant at the time, provided the mixture is within temperature limits specified.
- B. Paving (NYSDOT) - All asphalt concrete shall be installed using self-powered units in accordance with the NYSDOT Specification "401-3.05 Bituminous Pavers and 401-3.11 Spreading and Finishing", except that the sixth paragraph of 401-3.11 beginning with the words "If there are less than 1500 square yards. . ." is deleted and the following substituted:
  1. A self-powered paving unit shall be provided except where hand methods are permitted by the Engineer in small areas or areas inaccessible to a paving unit. For such areas, the mixture shall be dumped, spread, screened and compacted to give the required section and compaction thickness.
  2. Surface Treatment (NYSDOT) - Bituminous surface treatment to be constructed in accordance with NYSDOT "Section 410 Bituminous Surface Treatment - Single Course", Paragraphs 410-1 through 410-3.01 G.

- D. Compaction - Asphalt concrete shall be compacted in accordance with NYSDOT Specification “401-3.12 Compaction and 401-3.13 Joints” using either option as follows:
1. Option A - Three roller compaction train.
  2. Option B - Vibratory compaction.
- E. The required number of passes for either vibratory or static rollers, listed in Table 1, are minimum and may be increased by the Engineer. One pass shall be defined as one movement of the roller over any point of the pavement in either direction. Static roller passes shall continue until all ruts, ridges, roller marks or other irregularities are removed from the surface. The Engineer may alter the compaction procedures for small areas where the specified procedures are not practical.

**TABLE 1**

**REQUIRED NUMBER OF PASSES (MINIMUM)**

PAVEMENT COURSES	VIBRATORY ROLLER		STEEL-WHEEL TANDEM FINISH ROLLER
	VIBRATING PASSES (1)	STATIC PASSES (2)	STATIC PASSES
Base (Open graded each lift)	4	2	5
Base (Dense graded)	4	2	5
Binder (Dense graded)	4	Not required	5
Top (Dense graded all types)	2	Not required	2

**NOTES:**

1. The required number of vibrating passes shall be reduced by one-half (1/2) for dual vibrating drum rollers when the drums are tandem and are both in the vibrating mode.
  2. The required number of static passes may be completed by the vibratory roller operating in the static mode.
- F. Unless otherwise directed by the Engineer, vibratory rollers having pneumatic drive wheels shall compact the longitudinal joint by using one of the pneumatic drive wheels to overlap the joint in two passes with the drum operating static. Unless otherwise directed by the Engineer, dual vibrating drum rollers shall compact the joint by overlapping the joints in two passes with both drums operating static.
- G. To prevent adhesion of the mixture to the drum(s), the drum(s) shall be kept properly moistened with water, or water mixed with small quantities of detergent or other Department approved materials. If required to prevent pneumatic tire pickup, the pneumatic drive wheels may be coated with a fine mist spray of fuel oil or other similar material. In all instances, the surface of the pavement shall be protected from drippings of fuel oil or any other solvents used in pavings, compaction or cleaning operations.
- H. If the Engineer determines that unsatisfactory compaction is being obtained or damage to highway components and/or adjacent property is occurring using vibratory compaction equipment, the Contractor shall immediately cease using this equipment and proceed with the work in accordance with the conventional static compaction procedures at no additional cost.

The Contractor should note that if he elects to use vibratory compaction equipment, he assumes full responsibility for the cost of repairing all damage that may occur to highway components and adjacent property or underground utilities.

### 3.09 DRIVEWAYS AND PARKING AREAS

- A. Paving materials, type of paving, depth of various courses, etc., shall be as shown on the Drawings.
  - 1. The driveways and parking areas shall be cut back 12 inches from outside disturbed or damaged areas as described above and in Section 02112.
  - 2. The minimum depth of subbase shall be 12 inches of Type 2 gravel as shown on the Contract Drawings.
  - 3. The work shall include proper compaction of any necessary subbase, base course and paving courses, in accordance with Section 02228.
- B. Bituminous surfaces shall be restored with asphalt concrete matching existing, but in no case shall be less than 2 inches of Type 3 binder and 1 inch of Type 6 top course as specified in the applicable Articles of this Section.
- C. Non-Bituminous Surfaces - Where shown on the Drawings, construct new driveways and parking areas or restore existing driveways and parking areas as follows:
  - 1. Gravel surfaces shall be restored using screened gravel, matching existing, but in no case shall be less than 6 inches thick. The gravel shall be graded, shaped and compacted. Loose stones shall be removed.
  - 2. Crushed stone surfaces shall be restored matching existing stone, but in no case shall be less than 1-inch thickness of stone. Stone to be compacted with a roller.

### 3.10 SEAL COAT

- A. Apply seal coat to surface course and asphalt curbs in accordance with State Department of Transportation standards.

### 3.11 GEOTEXTILE FABRIC - REINFORCED ASPHALT CONCRETE OVERLAYS

- A. Place geotextile fabric between an existing deteriorated pavement surface and a new asphalt concrete top course.
  - 1. The fabric shall be applied at least full lane width on a tack coat applied at a rate of 0.20 to 0.35 gallons per square yard of asphalt cement to the clean and properly prepared base.
  - 2. Full pavement width application of the geotextile fabric is preferred, however, where that is not possible in order to accommodate traffic or because of pavement widths in excess of available fabric widths, adjacent passes of fabric shall overlap the first pass by at least 3 inches and be tack coated per manufacturer's recommendations.
- B. The asphalt concrete overlay shall be applied to the fabric as soon as practicable after the fabric has been placed.
  - 1. In any event, no vehicular traffic shall be allowed on the fabric after placement except the paving machine and trucks and then the asphalt concrete trucks shall avoid sharp turns, which may move, stretch, rip or otherwise damage the fabric.
  - 2. Damaged fabric to be repaired per manufacturer's recommendations.
  - 3. The asphalt overlay shall be as shown on the Drawings.

### 3.12 TOLERANCES

- A. Surface Tolerance - The pavement surface shall be constructed to a 1/4-inch tolerance. If, in the opinion of the Engineer, the pavement surface is not being constructed or has not been constructed to this tolerance based upon visual observation or upon riding quality, he may test the surface with a 16-foot straight edge (furnished by the Contractor) or string line placed parallel to the centerline of the pavement and with a 10-foot straight edge or string line placed transversely to the centerline of the pavement on any portion of the pavement.
  - 1. Variations exceeding 1/4-inch shall be satisfactorily corrected or the pavement relayed at no additional cost as ordered by the Engineer.
- B. Thickness Tolerance - The thickness indicated for each of the various courses of bituminous pavement is the nominal thickness. The pavement shall be so constructed that the final compacted thickness is as near to the nominal thickness as is practical, and within the tolerances specified below.
  - 1. Material, which is part of a trueing or leveling course or shim course, will not be considered in pavement thickness determinations.
  - 2. A tolerance not to exceed 1/4-inch from the nominal thickness required for the course specified under one pay item will be acceptable where the required nominal thickness is 4 inches or less. A tolerance not to exceed 1/2-inch from the nominal thickness required for the course or courses specified under one pay item will be acceptable where the required nominal thickness is over 4 inches. In addition, the sum total thickness of all bituminous mixture courses shall not vary from the total of the nominal thickness indicated on the plans by more than 1/4-inch where the total nominal thickness is 4 inches or less; or more than 1/2-inch where the total nominal thickness is over 4 inches but not more than 8 inches; and by not more than 5/8-inch where the total nominal thickness is more than 8 inches.

### 3.13 FIELD QUALITY CONTROL

- A. The required degree of compaction for wearing or top courses and shim course is a finished product having not more than 7 percent air voids.

### 3.14 PROTECTION

- A. Any pavement, constructed or reconstructed, which is subsequently damaged due to activity of work under this contract, shall be removed and replaced by the Contractor at no additional cost to the Owner.
- B. Protect pavement from vehicular traffic until compaction is completed.

### 3.15 SPEED BUMPS

- A. All speed bumps shall be replaced after milling and top course of road has been completed. New speed bumps shall match existing dimensions. Contractor shall paint if required.

## TESTING OF ASPHALT CONCRETE

DESCRIPTION	MARSHALL TEST	FIELD CORES AND AIR VOID, ASPHALT CONTENT, GRADATION AND THICKNESS OF PAVEMENT DETERMINATION
Projects consisting of OVERLAY over existing pavement: a) Up to 1,000 tons of material placed b) Over 1,000 tons of material placed	None  Two tests for each 1,000 tons placed	None  10 cores and tests for each 1,000 tons placed
Projects consisting of NEW ROAD OR STREET construction or reconstruction: a) Up to 200 tons of top course material placed b) Between 200 tons and 300 tons of top course material placed c) Over 300 tons of top course material placed	None  2  1 test for each additional 100 tons placed	None  Minimum of two for each 100 tons placed  2 for each additional 100 tons placed
Projects related to airport construction, reservoir linings, drainage channels, and special projects	(Spec. Writer to complete test requirements.)	

Based on the results of the air voids determination in the installed asphalt concrete top course, the following criteria shall apply to the payment for the top course material and installation:

% VOIDS	% PAID
0 - 7	100
7.1 - 8	95
8.1 - 9	90
9.1 - 10	80
10.1 - 11	70
11.1 - 12	50
Over 12	Rejected (No payment)

END OF SECTION

SECTION 02523  
CONCRETE WALKS

PART 1     GENERAL

1.01     SECTION INCLUDES

- A.   Concrete sidewalks, single course, double course, reinforced and unreinforced.
- B.   Base preparation.
- C.   Placing, finishing, curing.
- D.   Tolerances.
- E.   Flatness test.
- F.   Warranty.

1.02     RELATED SECTIONS

- A.   Section 02316 - SELECT GRANULAR MATERIALS.
- B.   Section 02351 - EXCAVATION, BACKFILL, AND TRENCHING.
- C.   Section 02228 - COMPACTION.
- C.   Section 03300 - CAST-IN-PLACE CONCRETE.

1.03     REFERENCES

- A.   ASTM C-33 - Concrete Aggregates.
- B.   ASTM D-1751 - Preformed Expansion Joint Filler.
- C.   NYSDOT Standard Specifications.

1.04     PERFORMANCE REQUIREMENTS

- A.   Qualified Sidewalk Contractor
  - 1.   All sidewalk work shall be performed by a qualified sidewalk contractor or subcontractor acceptable to the Owner and the Engineer.
  - 2.   The Contractor shall submit in writing to the Engineer the name and qualifications of the organization, which he proposes to employ for the sidewalk work.
- B.   It shall be the Contractor's responsibility to perform all work within the prescribed temperature, moisture and weather limitations imposed herein and by Division 3 specifications.

1.05     SUBMITTALS

- A.   None; reference Division 3 specification requirements.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with Division 3 specifications.
- B. Obtain concrete and its materials from same source throughout project.

1.07 REGULATORY REQUIREMENTS

- A. Conform to New York State standards for placing sidewalks on private property.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Do not place concrete when base surface is less than 40 degrees F.
- B. Protect surface of freshly placed concrete from adverse weather conditions, rain, freezing and damage or defacement from vandalism. Reference Section 03300.

1.09 WARRANTY

- A. For a period of one year after issuance of the Certificate of Substantial Completion, the Contractor shall promptly maintain, repair, and/or replace any sidewalk which has settled, cracked, or is damaged due to settlement or defective materials or workmanship.
- B. If settlement or tilting of  $\pm 1/4$  inch or more has occurred, the sidewalk section shall be removed and the subbase restored and compacted before replacement of the concrete.

PART 2 PRODUCTS

2.01 AGGREGATE BASE

- A. Aggregate base course material shall be "Type B-4 screened gravel" and meet the following:
  - 1. Shall be a mixture of hard, durable gravel and sand.
  - 2. Shall be free from organic matter, trash, shale, debris, snow ice and other frozen or mechanically deleterious material.
  - 3. Shall also meet the following gradation by weight requirements:

<u>% Passing</u>	<u>Sieve</u>
100	2-inch
75-90	1-inch
55-85	3/4-inch
30-65	1/4-inch
5-40	No. 40
0-20	No.200
0-8	No. 200

2.02 FORM MATERIALS

- A. Sidewalk forms shall be either steel or wood, and shall be equal in depth to the thickness of the sidewalk.

2.03 REINFORCING

- A. Welded wire reinforcement shall consist of 6-inch by 6-inch W2.9 x W2.9 in accordance with the requirements of Section 03300.
- B. Metal supports shall be used for welded wire fabric.



2.04      PREMOULDED JOINT FILLER

- A.    Expansion joint material shall be bituminous joint filler in accordance with ASTM D-1751.

2.05      CONCRETE SIDEWALKS

- A.    Concrete shall be “Mix E” having a nominal 28-day strength of 5000 psi as stated in the Contract Drawings.

2.06      CURING AND PROTECTION

- A.    Curing shall be in accordance with Section 03300 either “Waterproof Paper Blankets;” “Quilted Covers;” “Polyethylene Coated Burlap Blankets;” or “Polyethylene Curing Covers.”

2.07      JOINT SEALANT

- A.    Joint sealant to be a grey polyurethane sealant. Use “Sikaflex 1CSL” by Sika Corporation, “Sonolastic SL2” by Sonneborn, or equal.

2.08      CONCRETE SEALANT

- A.    The concrete shall be sealed with a sealer membrane compound, Type E floor finish per Section 03600.

PART 3      EXECUTION

3.01      EXAMINATION

- A.    The finished grade and alignment of sidewalk replacements to match existing conditions, jointing and shape that existed prior to removal, unless otherwise shown on the Drawings.
- B.    New concrete walks at street intersection shall be constructed with ADA-type ramps in accordance with regulatory requirements and with the details shown on the Drawings.

3.02      PREPARATION

- A.    Prior to the start of each day’s concrete placement, the sidewalk forms shall be placed and graded to the proper alignment and grade.
- B.    Forms shall be held firmly in place using steel pins driven into the ground.
- C.    Subgrade
  - 1.      Overexcavate to install a minimum 10 inches compacted subgrade material.
  - 2.      The subgrade shall be graded, leveled and compacted to a smooth surface, parallel to the final surface.
  - 3.      The subgrade shall be free from all bumps, depressions, standing water, roots, organic material and deleterious material.
- D.    Where new or replacement concrete sidewalk is to meet existing sidewalk, the existing sidewalk shall be removed back to the first expansion or contraction joint.
- E.    Tree roots, which interrupt the proposed alignment and profile on the new sidewalk, shall be removed to provide a 6-inch clearance between root and edge or bottom of sidewalk.

- F. Any valve boxes, curb boxes, manhole covers, etc., encountered or to be located in the sidewalk area shall be adjusted so that the cover is flush with the top surface of the sidewalk.
1. All valve boxes, curb boxes, etc., shall be left in such a way that the covers are easily removed and the boxes shall function in the manner in which they were intended.
  2. All covers shall be cleaned and restored to their original condition, free from concrete and asphalt.

### 3.03 INSTALLATION

#### A. Concrete Sidewalks

1. Concrete thickness shall be 4 inches, except that it shall be 6 inches through driveways, parking areas or roadways subject to vehicular traffic.
2. At driveway crossings and in all other locations where vehicular traffic crosses, install two layers of welded wire reinforcement.
3. The final surface shall be leveled, floated and allowed to “set” slightly prior to the final troweling.

#### B. Expansion Joints

1. Sidewalks shall have transverse expansion joints consisting of 1/2-inch wide premoulded bituminous joint fill for full depth of concrete, spaced 15 feet apart or every third joint.
2. Sidewalks wider than [10] feet shall be divided by a 1/2-inch wide expansion joint of premoulded bituminous joint filler and sealed.
3. Match adjacent expansion or contraction joints in curbs or pavements.
4. Premoulded bituminous joint filler shall also be placed between sidewalk and curbs, pavements, buildings, steps, changes in direction, manhole frames, valve boxes and other fixed items within the concrete sidewalk area including any construction joints.
  - a. The top of the premoulded bituminous joint filler shall be set 1/4-inch below finished grade to allow room for the joint sealant.
  - b. After completion of finishing the concrete walk surface, the joint sealant shall be installed to completely fill all expansion joints.

#### C. Contraction Joints - The top surface shall be scored with contraction joints not less than 2 inches deep at intervals of 3 to 5 feet so that the finished walk will be marked in squares both longitudinally and transversely.

1. Coordinate joint layout with expansion joints, intersections and structures.
2. Contraction joints may be constructed using 1/4-inch by 2-inch steel plates inserted in the freshly screeded concrete prior to finishing.
3. After finishing is complete and the initial set is started, remove plate and finish joints.
4. As an alternate, contraction joints can be saw cut to 1-inch depth within 24 hours after concrete placement.

### 3.04 FINISH

- A. Sidewalk top surface to be finish troweled with a steel trowel followed by a broom finish.
  - 1. Where walk grades are more than 5 percent and at ramps the broom finish shall leave striations approximately 1/8-inch deep.
  - 2. After brooming, all edges and joints shall be edged with an edging tool of 1/4-inch radius.
- B. Vertical faces of concrete to remain exposed after final grading shall receive a smooth rubbed finish.

### 3.05 CURING AND PROTECTION

- A. Reference Section 03300
- B. The edges and faces of concrete exposed by the removal of forms shall be protected immediately to provide these surfaces with continuous curing treatment equal to the method selected for curing the walk surface.
- C. The selection of materials and methods shall provide protection from freezing temperatures.
- D. Concrete shall be kept cured and free of vehicles for at least seven days.
  - 1. Where necessary to provide vehicular access, provide suitable bridging or plates (not supported by the fresh concrete) during the curing process.

### 3.06 SURFACE SEALANT

- A. After curing, the exposed concrete surfaces shall be allowed to dry and then be sealed with a saline sealant as specified in Section 03300.

### 3.07 TOLERANCES

- A. Finished subgrade shall be  $\pm 1/2$  inch of its proposed grades.
- B. Finished walk surfaces shall be  $\pm 1/4$  inch of its proposed grade.
- C. Joints shall be perpendicular to the run of the sidewalk with no more than 1/4-inch differential between one side to the other.

### 3.08 FLATNESS TEST

- A. After the concrete has hardened sufficiently to avoid marking the surface, the Engineer shall test the surface, longitudinally and transversely, with a straight edge or string line 6 to 10 feet long (two walk blocks long).
- B. Areas with high spots of more than 1/4-inch in 6 to 10 feet or where surface is concaved and exceeds 1/2-inch in 6 to 10 feet, the sidewalk shall be removed to the nearest joints and replaced at the Contractor's expense.

### 3.09 PROTECTION

- A. Any sidewalk constructed that is damaged due to negligence, activity of work, vandalism, or marked by vehicular or pedestrian traffic shall be removed and replaced by the Contractor at no additional cost.

END OF SECTION

## SECTION 02668

### DISPOSAL OF HAZARDOUS MATERIALS CONTAINING LEAD

#### PART 1 GENERAL

##### 1.01 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 Contract.

##### 1.02 RELATED SECTIONS

- A. Section 02050 – DEMOLITION.
- B.
- C. Section 01331 – SHOP DRAWING PROCEDURES.
- D.
- E. Section 02669 – PAINTING OF THICKENER-CLARIFIER TANKS.
- F.

##### 1.03 D. Section 09900 – PAINTING. REFERENCES

- A. Lead Survey included in Appendix D- Asbestos and Lead Report, Prepared by Stohl Environmental.
- 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.

#### 1.04 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.

#### 1.05 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 paint 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 Stohl Environmental.
- 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 lead particles.
  - 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 02669

### PAINTING OF THICKENER-CLARIFIER TANKS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. General requirements.
- B. Related sections.
- C. References.
- D. Submittals.
- E. Quality assurances.
- F. Warranty.
- G. Safety.
- H. Permits.
- I. Protection of existing facilities.
- J. Materials.
- K. Containment systems.
- L. Method of assessing quantity of emissions.
- M. Miscellaneous repairs.
- N. Surface preparation.
- O. Applications.
- P. Testing.
- Q. Anniversary inspection.
- R. Disinfection.
- S. Cleanup.

##### 1.02 GENERAL REQUIREMENTS

- A. The following structures shall be painted according to this section:
  - 1. Steel distribution structure as shown on the Contract Drawings.
  - 2. Two existing thickener/clarifier tanks as shown on the Contract Drawings. CONTRACTOR shall not rely on any existing rigging found on or in the tank and shall provide new rigging as necessary to perform the work.

- B. All products in this section shall conform to the requirements of the standard specifications referenced herein.
- C. The painting contractor shall have a minimum of five consecutive years of experience in painting steel water storage tanks. All coatings shall be applied by applicators with a valid New York State CONTRACTOR's license.
- D. The OWNER will drain the tank and remove all sediment prior to the CONTRACTOR initiating the Work on each tank. It is the CONTRACTOR's responsibility to remove and properly dispose of, off site, remaining puddled water in the tank prior to initiating cleaning operations. The CONTRACTOR shall notify the OWNER in writing one week prior to needing the tank drained for his operations.
- E. All surface preparation, priming, and painting shall be in accordance with Articles 3.06 and 3.07 of this section.
- F. Work shall be coordinated with the interior tank modifications shown on the Drawings.
- G. Prosecute work in conformance with time schedule of operations approved by the OWNER and ENGINEER.

#### 1.03 WASTE DISPOSAL

- A. Hazardous material disposal shall be in accordance with Section 02668.
- B. Non-hazardous material disposal shall be included in the lump sum payment for General Construction.

#### 1.04 RELATED SECTIONS

The specification sections listed below are an integral part of this specification and the CONTRACTOR shall be responsible for coordinating and providing these sections to other subcontractors.

- A. Section 01562 - PROTECTION OF THE WORK AND PROPERTY.
- B. Section 02205 - PROTECTION OF EXISTING FACILITIES.
- C. Section 02668 - DISPOSAL OF HAZARDOUS MATERIAL CONTAINING LEAD.
- C. Section 01331 - SHOP DRAWING PROCEDURES.
- D. Section 09900 - PAINTING.
- E. Section 11335 - THICKENER-CLARIFIER SLUDGE COLLECTION EQUIPMENT.

#### 1.05 REFERENCES

- A. ASTM D522 - Mandrel Bend Test for Attached Organic Coatings, Test Method B - Cylindrical Mandrel Test.
- B. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
- C. ASTM D4060 - Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
- D. ASTM D3359 - Method for Measuring Adhesion by Tape Test.

- E. SSPC-VIS 1/ASTM D220 - Pictorial Surface Preparation Standards for Painting Steel Structures.
- F. SSPC-VIS 2/ASTM D610 – Standard Methods of Evaluating Degree of Rusting on Painted Steel Surface.
- G. SSPC-PA6 - Commercial Blast Cleaning.
- H. SSPC-SP10 - Near-White Blast Cleaning.
- I. SSPC-Guide 6 - Guide for Containing Debris Generated During Paint Removal Operations.
- J. SSPC-Guide 10 - Guide to Specifying Coatings Conforming to Volatile Organic Compound (VOC) Content Requirements.
- K. SSPC-SP1 - Solvent Cleaning.
- L. ASTM D2243 - Freeze-Thaw Test.
- M. ASTM D2247 - Humidity Test.
- N. ASTM E84 - Surface Burning Characteristics Test.
- O. ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.
- P. ASTM D2805 - Standard Test Method for Hiding Power of Paints by Reflectometry.
- Q. ASTM D1308 - Stain Resistance.
- R. The Society of Protective Coatings (SSPC) - Steel Structures Painting Manual, Volume 2, Systems and Specifications.
- S. American Water Works Association (AWWA).
  - 1. C-210 Standard Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.
  - 2. D102-06 Coating Steel Water Storage Tanks.
- T. National Sanitation Foundation - NSF Standard 61.
  - 1. Drinking Water System Components - Health Effects.
- U. OSHA regulations.
- V. AWWA Disinfection Standard C652-02 - Method 2 only.
- W. OSHA Training Certificates.

#### 1.06 SUBMITTALS

- A. In accordance with Section 01331, submit:
  - 1. Manufacturer's descriptive data fully describing each product, and its application instructions including:
    - a. Complete mixing instructions including acceptable thinning materials, acceptable tinting pigments, and identification of components shipped in separate containers.

- b. The quality and type of thinner recommended for each method of application, if applicable, shall be listed. Thinning recommendations shall cover the extreme limits of the allowable temperature range for application, as well as intermediate temperatures. Viscosity of liquid materials, when ready for application, shall be indicated in units appropriate for field determination, such as a #2 Zahn cup. Thinning shall only be permitted with the approved manufacturer and engineer.
  - c. The percent solids by volume for liquid materials and the volatile organic compound (VOC) content.
  - d. The theoretical spreading rate in square feet per gallon at 1 mil dry film thickness.
  - e. The net weight per U.S. gallon for liquid materials and the net weight of the total contents of a container for other materials.
  - f. Recommended drying time between coats and before immersion. The drying time shall be stated as the number of hours at 70 degrees F and 50 percent relative humidity and at the upper and lower limits of recommended application temperature and humidity.
  - g. The pot life after mixing shall be stated together with a description of variations caused by changes in temperature, humidity, or other ambient conditions.
  - h. Environmental limitations for application.
  - i. Flammability, toxicity, allergenic properties, and any other characteristics requiring field precautions shall be identified and specific safety practices shall be stipulated. For interior coatings, the amount of ventilation required during application inside a closed tank shall be stated.
2. Color cards illustrating range of colors and textures available for the exterior and interior finish coat. Colors shall be as selected by OWNER.
  3. Certification that the paint system for the tank meets NSF Standard 61 and all local, state, and federal volatile organic compound regulations.
  4. Certification from the paint manufacturer that paint of sufficient quantity and quality has been ordered to assure completion of the specified paint systems in their entirety.
  5. Certification of OSHA training by workers.
  6. Test reports, as specified herein and as required by reference standard in Article 1.05.
  7. Welders' procedures and qualifications.
  8. Written confirmation by the CONTRACTOR that they will provide the anniversary inspection in accordance with Article 3.09.
  9. Anniversary inspection reports, as specified herein.
  10. Manufacturer's descriptive data on products or equipment which will be used for blasting during paint removal and surface preparation including catalog cut sheets, specifications, MSDS sheets, and other related information.
  11. Certification from the manufacturer that all products meet federal, state, and local limits for VOC content.

#### 1.07 QUALITY ASSURANCE

- A. All materials shall be brought to the job site and remain in their original sealed containers with manufacturer's label intact. Manufacturer's name, product name and number, and color and batch number, shall appear on the label. The materials shall be new, unused, and within the manufacturer's recommended storage life.
- B. Manufacturer's representative shall advise applicator on proper surface preparation, paint application, color matching methods, techniques and procedures. A written report of his findings shall be delivered in duplicate to the ENGINEER. A minimum of one field visit by the manufacturer's representative is required at the beginning of the field surface preparation and painting operations. The OWNER and ENGINEER may request additional visits if, in their opinion, they are warranted.

- C. All coatings and paints shall be stored in enclosed structures to protect them from weather and excessive heat or cold. Flammable coatings or paint must be stored to conform to city, county, state and federal safety codes for flammable coating or paint materials. Coatings and paints shall be protected from freezing at all times.
- D. CONTRACTOR shall provide and maintain an OSHA-approved breathing apparatus with eye protection for the ENGINEER's representative at the beginning of the job prior to commencement of any work. The self-contained breathing apparatus shall be solely for the use of the ENGINEER's representatives during the project. CONTRACTOR shall replace filters as required.
- E. The CONTRACTOR shall provide all labor, materials and equipment to safely assist ENGINEER's representatives and the manufacturer's representative to safely observe all areas of the work during the surface preparation and painting of the tank. All special slings, harnesses, chairs, and safety ropes required for this observation shall be provided by the CONTRACTOR.
- F. CONTRACTOR shall provide a magnetic-type paint thickness gauge to verify paint coverage. This gauge shall be available for use by ENGINEER's representative and shall be calibrated weekly. Results of each calibration shall be recorded.

#### 1.08 WARRANTY

- A. Include coverage for exterior peeling or excessive cracking determined by ENGINEER.
- B. The painting contractor shall warranty his workmanship for a minimum of two years.
- C. The paint manufacturer's representative shall warranty his materials for a minimum of two years after Certificate of Substantial Completion.
- D. If the OWNER or ENGINEER determine a defect in materials or workmanship within the stated period, the responsible parties will make any necessary repairs without charge to the OWNER.

#### 1.09 SAFETY

- A. The CONTRACTOR shall be responsible for performing this work in a safe manner in accordance with all applicable, federal, state, and local laws, rules and codes. The CONTRACTOR shall provide protection for his workers in accordance with OSHA regulations. CONTRACTOR and workers shall have taken 40-hour OSHA course and be trained by OSHA in confined space entry. The CONTRACTOR shall supply written verification of OSHA safety training. This verification shall be submitted to the OWNER.
- B. The CONTRACTOR must ensure that the waste and debris generated by his work is stored, handled and disposed in a safe manner in strict compliance with all local, state, and federal regulations.

#### 1.10 PERMITS

- A. The CONTRACTOR shall apply, pay for, and acquire all permits, as required by local, state, and federal regulations prior to commencement of any surface preparation material application or waste removals.

#### 1.11 PROTECTION OF EXISTING FACILITIES

- A. The CONTRACTOR shall protect existing overflows, inlets, outlets, drains, or any other penetration in the tank from debris and paint over spray generated during the painting operation. Protection shall include, but not be limited to, caps, shields, or taped closed openings that prevent the influx of any debris during construction.

All work to protect penetrations shall be done in accordance with this and any other section of these specifications.

- B. Containment systems constructed for this work must protect the environment, workers, and OWNER's representatives from overspray of paint and blasting abrasives or debris.

## PART 2 PRODUCTS

### 2.01 PAINT MANUFACTURERS

- A. Tnemec Company, Inc.
- B. The Carboline Company, part of the StonCor Group, an RMP Company (TCC).
- C. PPG Industries.
- D. Dupont.
- E. Or approved equal.
  - 1. Equivalent materials of other manufacturers may be substituted only by approval of the ENGINEER. Requests for substitution shall include manufacturer's literature for each product, giving the name, generic type, descriptive information, certified test reports verifying product performance, solids by volume, recommended dry film thicknesses, and a list of 10 projects where each product has been used and rendered satisfactory service for more than 10 years. No request for substitution shall be considered that would decrease film thickness or offer a change in the generic type of coating specified. OWNER's desired color must be available in substitute products.
  - 2. Bidders desiring to use coatings other than those specified shall submit those with their Bid Proposal based on the specified materials, together with the information required in the General Conditions paragraph 6.05, Section 01331, and Section 01630 and indicate the sum which will be deducted from the base bid should alternate materials be accepted. No additional compensation will be provided to the CONTRACTOR for use of "or equal" products.
  - 3. The OWNER's cost for ENGINEER's review of "or equal" products after award of the bid shall be the responsibility of the CONTRACTOR and will be deducted from payments due to the CONTRACTOR in accordance with General Conditions paragraph 6.05.E.

### 2.02 MATERIALS

- A. Paint - Refer to schedule at end of this specification.
- B. Seam Sealant - Refer to schedule at the end of this specification.
- C. Abrasive Blasting Material - Coal-fired boiler bottom slag "Black Beauty" or approved equal, or steel grit meeting the requirements of this section.
  - 1. All material delivered to the site shall be new virgin material, free from defects and imperfections. The material shall be a medium grade.
  - 2. Delivered material must remain in sealed containers until ready for use, and all abrasive material must be stored in a protected area clearly designed for storage of unused blasting media.
  - 3. Recycled Steel Abrasives
    - a. Recycling equipment shall be well maintained in good condition and contain filters on the processed air system to clean all oils, dirt and dust that may be introduced into the air stream. Diesel exhaust or other exhaust shall be directed away from the tank and away from neighboring residents.



- b. After use, the steel abrasive may be recycled, and all intermediate waste generated during the recycling operation shall be collected separately and tested in accordance with Article 1.05.
  - c. Collection of spent steel must be performed to avoid the introduction of foreign material such as dirt or ground litter. Tarps must be placed on the ground within the containment area and under the recycling equipment, so identification of fallen abrasive is clear.
  - d. All dust resulting from blast cleaning operations shall be completely removed from metal surfaces prior to priming, collected, and tested in accordance with Article 1.05. All cleaned surfaces shall be subject to inspection by the ENGINEER or the coating manufacturer prior to application of paints. Solvent cleaning shall be in accordance with SSPC-SP1 (latest revision).
4. Coal-Fired Bottom Slag
- a. Use of blended abrasives is not permitted.
  - b. Collection and testing of the material after it is used shall be completed in strict accordance with the manufacturer's recommendation and these specifications.
  - c. Containers used for collection shall be new and in excellent condition, with no cracks, leaks or imperfections that could result in material escaping. Liners are permitted in containers, providing they are heavy-duty material suited for the application, and approved by the ENGINEER.

## 2.03 CONTAINMENT SYSTEM

- A. CONTRACTOR shall provide a containment system around the Thickener-Clarifiers during sand blasting and painting activities.
- B. CONTRACTOR shall be responsible for collecting fumes and particulate matter derived from blasting and painting activities that occur within the containment system. The containment system shall be built in a manner that maintains proper airflow across the painting area, toward a filter media, and out of the building. The emission of air contaminants shall be in compliance with NYSDEC and EPA regulations.
- C. In addition to the ventilation required for containment of blasting debris, the CONTRACTOR shall provide air movement inside containment to provide visibility and protection of the workers from health hazards in accordance with OSHA regulations. Additionally, blasting and painting personnel shall be equipped with proper PPE, including a respirator, safety glasses, and Tyvek suit or other form of skin protection, to protect the worker from fumes and particulate matter.
- D. Emissions containment system shall be adequately sealed during blasting and painting operations to prevent air emissions. The containment system shall be suitable to achieve Level 1 emissions as determined from visual observations from the ENGINEER's representative, or to meet ambient air quality standards for PM-10 as determined from high volume air quality monitoring, whichever is applicable during blasting and painting operations.
- E. CONTRACTOR shall provide dust collection.

## PART 3 EXECUTION

### 3.01 GENERAL

- A. All coordination for compatibility between coats and matching of colors shall be the responsibility of the CONTRACTOR.

- B. Where thinning is necessary, only the approved products of the particular manufacture furnishing the paint shall be used, as approved by the engineer, and all such thinning shall be done in strict accordance with the manufacturer's instructions. The use of thinners shall not cause the total VOC (lbs/gal) to exceed all allowable limits for paint volatile organic compounds.
- C. All materials used on this project, whether shop applied by the manufacturer or field applied by the CONTRACTOR, shall comply with all current federal, state, and local Clean Air Act-related regulations. It shall be the responsibility of the manufacturers to comply with the laws in effect at their painting facilities.
- D. Each coat of paint shall be of a different color shade in order to verify coverage.
- E. All waste material generated on this project, must be handled, stored and disposed of in strict accordance with all state, local and federal laws and regulations.
- F. All temporary containment or rigging supports shall be removed and painting systems repaired in accordance with these specifications (both interior and exterior) on completion of the project.

### 3.02 EXAMINATION

- A. Verify that substrate conditions are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Correct any conditions that may potentially affect proper application. Surface contaminations such as dust and moisture films shall be wiped clean and dry prior to product application.

### 3.04 METHOD FOR ASSESSING QUANTITY OF EMISSIONS

- A. Visible Emissions, Method A - Observations of visual emissions from the containment area shall be used to provide feedback on the performance of the containment system. The visible emissions will be evaluated by the ENGINEER's representative. The containment system used for any field application or blast cleaning shall be capable of achieving Level 1 emissions as defined in SPCC Guide 6, Section 5.5-Methods for Assessing Quantity of Emissions. If Level 1 emissions are not achieved, as determined by the ENGINEER's representative, the CONTRACTOR will be required to provide and pay for ambient air monitoring to verify that ambient air quality standards are being achieved. Ambient air quality monitoring during blasting operations will be provided by the CONTRACTOR at the CONTRACTOR's expense with no additional compensation from the OWNER.

### 3.05 MISCELLANEOUS REPAIR

- A. Pits and Pit Repair - Following surface preparation of each section and prior to prime coat application, an inventory of pits requiring repair shall be compiled by the CONTRACTOR and submitted to the ENGINEER's representative. Number and estimated area (in square inches) of "deep pits" shall be included. "Deep pits" shall be defined as pits with a depth exceeding 25 percent of original steel thickness and shall be filled by welding. Pits less than this depth shall not require welding repair and shall be filled with epoxy filler/surfacer in. Following welding, all filled areas shall be ground smooth and surface prepared in accordance with the applicable specifications for that surface. Within areas of heavy damage, the ENGINEER shall specify procedures to repair the damaged area, subject to the approval of the OWNER. All welding shall be performed by qualified welders and conform to AWWA standards. Welding procedures to be utilized by the CONTRACTOR, as well as welders' qualifications, shall be submitted to ENGINEER and approved prior to commencing pit repair.
- B. Payment for all miscellaneous repair work including interior pit repair, exterior pit repair, and welding shall be included in Bid Item 4 – Contingency Allowance for Miscellaneous Repair Work.

### 3.06 SURFACE PREPARATION

- A. The CONTRACTOR shall prepare test sections of the structure (or test panels of a similar nature) as representative samples of the surface preparation standards specified. Upon acceptance by the ENGINEER's representative, these samples shall constitute the standards to which all further surface preparation shall be compared.

ENGINEER's representative may perform field priming observation at the ENGINEER's discretion. Field observation considers any preparation or painting practices that take place on the project site. Where vacuum-assisted power tools are used, the CONTRACTOR is required to meet all requirements of Article 3.03.

Surface preparation will also be checked against SSPC and NACE. Pictorial standards shall be used to confirm the degree of surface preparation.

- B. All weld slag, spatter, burrs, and lugs shall be removed from the areas to be coated before coating application begins.
- C. All exterior steel surfaces shall be prepared according to Article 3.11-Schedule for Painting.  
  
All interior steel shall be prepared according to Article 3.11-Schedule for Painting.  
  
All interior concrete surfaces shall be prepared according to Article 3.11-Schedule for Painting.
- D. Abrasive used in blasting cleaning operations shall be new, washed, graded, dry, and free of contaminants or oils and greases that would interfere with adhesion of coating or paint. Abrasive used may be recycled steel grit "shot" or coal fuel slag "Black Beauty" or approved equal.
- E. At least two hours prior to painting, all steel surfaces shall be cleaned with brooms and blown down with compressed air to remove any dust or surface films.
- F. All surfaces abrasive blast cleaned shall be painted within the same day and before any evidence of rust or erosion. No coatings or paint shall be applied over damp or moist surfaces.
- G. Field blast cleaning for all surfaces shall be by dry method unless otherwise directed.
- H. Particle size of abrasive used in blast cleaning shall be that which will produce a 1-1/2 to 2 mil (37.5 microns to 50.0 microns) surface profile, or in accordance with recommendations of the manufacturer of the specified coating or paint system to be applied.
- I. During blast cleaning operations, caution shall be exercised to ensure that existing coatings or paint are not exposed to abrasion from blast cleaning.
- J. The CONTRACTOR shall keep the area of his work in a clean condition and shall not permit blasting materials to accumulate as to constitute a nuisance or hazard to the prosecution of the work or the operation of the existing facilities.

### 3.07 APPLICATIONS

- A. Verify that substrate conditions are ready to receive work as instructed by the product manufacturer. No painting whatsoever shall be accomplished in rainy or excessively damp weather when the relative humidity exceeds 80 percent, when the temperature is less than 5 degrees F above the dewpoint, or when the general air temperature cannot be maintained at 50 degrees F (10 degrees C) or above throughout the entire application and curing period. No exceptions to this condition will be allowed.

- B. Examine surfaces scheduled to be finished prior to commencement of work. Correct any conditions that may potentially affect proper application.
- C. All sharp edges from weld slag, spatter, burrs, lugs, and welds not ground smooth shall be ground smooth prior to application of paint.
- D. The CONTRACTOR shall meet with and receive approval from the ENGINEER's representative for all prepared surfaces before coating application begins. The CONTRACTOR shall report any conditions that would adversely affect the appearance or performance of the coating systems to the ENGINEER. Coatings applied to prepared surfaces not approved by the ENGINEER shall be removed and replaced.
- E. Surfaces showing any traces of rust or dust shall be prepared again before coating application.
- F. Unless otherwise specified, the requirements of SSPC-PA1 and AWWA Standard D102 and the paint manufacturer's recommendations shall be followed for the painting of steel surfaces.
- G. Fan forced ventilation exhausting from the bottom of the tank shall be maintained during the entire painting and curing period of the interior coating system, at manufacturers recommended rate and time period.
- H. Colors shall be as approved by the OWNER. Color contrast shall be provided for each coat (i.e., all coats shall have a different shade).
- I. Each application of coating or paint shall be applied evenly, free of brush marks, sags, runs, with no evidence of poor workmanship. Care shall be exercised to avoid lapping on glass or hardware. Coatings and paints shall be sharply cut to lines. Finished surfaces shall be free from defects or blemishes.
- J. Protective coverings or drop cloths shall be used to protect floors, fixtures, and equipment. Care shall be exercised to prevent coatings or paints from being spattered onto surfaces that are not to be coated or painted. Surfaces from which materials cannot be removed satisfactorily shall be recoated or repainted as required to produce a finish satisfactory to the ENGINEER/OWNER's agent.

### 3.08 TESTING

- A. The CONTRACTOR shall verify the paint film thickness by measuring the wet film thickness of each coat as it is applied, and the dry film thickness of the entire system.
  - 1. The wet film thickness shall be measured with a gage that will measure the wet film thickness within an accuracy of  $\pm 0.5$  mil. A wet film thickness measurement shall be made for each 100 square feet of surface painted.
  - 2. After manufacturer's recommended curing time, the dry film thickness shall be measured in accordance with SSPC-PA2 with a non-destructive magnetic gage that will measure the dry film thickness within an accuracy of  $\pm 0.25$  mil. As many dry film thickness measurements as feasible shall be made so that there is approximately one measurement for each 100 square feet of surface painted. Additional coats shall be applied in order to attain the minimum dry film thickness specified, with no additional compensation from the OWNER. A typed report on the results of the wet film and dry film measurements shall be submitted in accordance with Section 01700.
- B. CONTRACTOR shall arrange for manufacturer to inspect the application of his product and shall submit his report to ENGINEER identifying products used and verifying that said products were properly applied and that paint systems were proper for the exposure and service. The manufacturer's representative shall also certify that all coats in each system are compatible with one another.

C. Holiday Testing

1. All interior wet surfaces shall be tested by the painting contractor with an appropriate holiday detector in the presence of the ENGINEER's representative. Locations where holidays are detected shall be marked for repair and retested after repair work has been completed.
2. Coating integrity of interior coated surfaces shall be tested with an approved inspection device.
3. Holiday detection shall be performed prior to application of aluminum or metallic finish coats. Non-destructive holiday detectors shall not exceed 67-1/2 volts, nor shall destructive holiday detectors exceed the voltage recommended by the manufacturer of the coating system. For thicknesses between 10 and 20 mils (250 microns and 500 microns), a non-sudsing type wetting agent such as Kodak Photo-Flo shall be added to the water prior to wetting the detector sponge.
4. All pinholes shall be marked, repaired in accordance with the manufacturer's printed recommendations, and retested. No pinholes or other irregularities will be permitted in the final coating.

3.09 ANNIVERSARY INSPECTIONS

- A. All interior and exterior surfaces of the tank painted under this Contract shall be inspected by representatives of the OWNER and the CONTRACTOR at one year's time after the date of Substantial Completion of the contract to determine whether any repair work is necessary.
- B. The OWNER shall establish the dates for the inspections and shall notify the CONTRACTOR at least 30 days in advance. The OWNER will drain the tank and hose out any sediment prior to the inspection. The CONTRACTOR shall clean the tank and remove and properly dispose of remaining puddled water and shall provide suitable interior lighting, skyladders, and ventilation for his tank inspections and for access by the OWNER and OWNER's representative.
- C. Any location where coats of paint have peeled off, bubbled, or cracked, and any location where rusting is evident shall be considered to be a failure of the paint system. The CONTRACTOR shall make repairs at all points where failures are observed by removing the deteriorated coating, cleaning the surface, (as specified herein) and recoating with the same paint system. If the area of failures exceeds 25 percent of the area of a portion of the tank surface, then for that portion, the entire paint system shall be removed and repainted.
- D. The CONTRACTOR shall prepare and deliver to the OWNER a typed inspection report covering the anniversary inspections, setting forth the number and type of failures observed, the percentage of surface area where failure has occurred, and the name of the persons making the inspection. Color photographs illustrating each type of failure shall be included in the report. A description of the repair, including materials and thicknesses, shall be provided.

3.10 CLEANING

- A. Upon completion and acceptance of the work and removal of all foreign matter from the interior of the tank, the CONTRACTOR shall wash down with clean water and thoroughly flush out the entire tank interior.
- B. Upon completion and acceptance of the work, all staging, scaffolding and containers shall be removed from the site or destroyed in a manner approved by the ENGINEER/OWNER's agent. Coating or paint spots and oil or stains upon adjacent surfaces shall be removed and the job site cleaned. All damage to surfaces resulting from the work of this section shall be cleaned, repaired, or refinished to the satisfaction of the ENGINEER/OWNER's agent at no cost to the OWNER.

### 3.11 SCHEDULE FOR PAINTING

#### A. Exterior - Thickener/Clarifier Steel Surface

1. Exterior steel surfaces of the tank shall be prepared and painted in accordance with the following:
  - a. Surface Preparation - Prepare entire exterior tank surface in accordance with SSPC-SP 11 Power Tool Cleaning to Bare Metal. Feather the edges of tightly adhering intact coatings by sanding. All surfaces shall be clean and dry. Uniformly roughen all tightly adhered coatings by sanding with vacuum shrouded power tools.
  - b. Pit Filling - Fill all pits at the direction of the ENGINEER flush with surrounding surface with:
    - i. Paint: Tnemec Series 215-1212 (Gray) Surfacing Epoxy, Or Equal
    - ii. Troweled: 1/32 inch to 1/16 inch
    - iii. Filling: Patching up to 2 inches.
  - b. Spot Prime Coat – to all bare metal. Square up all spot primed areas.
    - i. Paint: Tnemec Series 135-DC74 (Off-White) Chembuild, Or Equal
    - ii. Dry Film Thickness: 4.0-5.0 mils DFT
  - c. Finish Coat – apply to entire exterior steel tank surface. Square up all spot finish coated areas. Uniform thickness and color required.
    - i. Paint: Tnemec Series N69-color Hi-Build Epoxoline II, Or Equal
    - ii. Dry Film Thickness: 3.0-5.0 mils DFT

#### B. Interior - Thickener/Clarifier Steel Surface

1. All interior steel surfaces of the tank shall be prepared and painted in accordance with the following:
  - a. Surface Preparation – To the entire interior steel tank surface apply a solution of bio-degradable detergent and allow to dwell on the substrate for 10-15 minutes. Rinse with fresh water at 3,000-4,000 psi to remove all sludge, dirt, soap and contaminants. Scrubbing will be necessary. Remove all wastewater and allow surfaces to dry. Abrasive blast clean all interior steel in accordance with SSPC-SP 10 Near White Blast Cleaning.
  - b. Prime Coat – apply to entire interior steel tank surface.
    - i. Paint: Tnemec Series N140-15BL (Tank White) Pota-Pox Plus, Or Equal
    - ii. Dry Film Thickness: 3.0-5.0 mils DFT
  - c. Pit Filling - Fill all pits at the direction of the ENGINEER flush with surrounding surface with:
    - i. Paint: Tnemec Series 215-1212 (Gray) Surfacing Epoxy, Or Equal
    - ii. Troweled: 1/32 inch to 1/16 inch
    - iii. Filling: Patching up to 2 inches.
  - d. Stripe Coat – apply one coat by brush to all edges, weld seams, nuts and bolts.
    - i. Paint: Tnemec Series N140-39BL (Delft Blue) Pota-Pox Plus, Or Equal
    - ii. Dry Film Thickness: 2.0-3.0 mils DFT
  - e. Intermediate Coat - apply to entire interior steel tank surface.
    - i. Paint: Tnemec Series N140-1255 (Beige) Pota-Pox Plus, Or Equal
    - ii. Dry Film Thickness: 4.0-6.0 mils DFT
  - f. Finish Coat - apply to entire interior steel tank surface.
    - i. Paint: Tnemec Series N140-15BL (Tank White) Pota-Pox Plus, Or Equal
    - ii. Dry Film Thickness: 4.0-6.0 mils DFT

#### C. Interior - Thickener/Clarifier Concrete Surface

1. All interior concrete surfaces of the tank shall be prepared and painted in accordance with the following:
  - a. Surface Preparation – Rout all cracks.
  - b. Prime Coat – apply to entire interior concrete surfaces
    - i. Paint: Tnemec Series N140-15BL (Tank White) Pota-Pox Plus, Or Equal
    - ii. Dry Film Thickness: 3.0-5.0 mils DFT



- c. Crack Filling - fill all cracks at the direction of the ENGINEER flush with surrounding surface with:
      - i. Paint: Tnemec Series 215-1212 (Gray) Surfacing Epoxy, Or Equal
      - ii. Troweled: 1/32 inch to 1/16 inch
      - iii. Filling: Patching up to 2 inches.
    - d. Intermediate Coat – apply to entire interior concrete surfaces
      - i. Paint: Tnemec Series N140-1255 (Beige) Pota-Pox Plus, Or Equal
      - ii. Dry Film Thickness: 4.0-6.0 mils DFT
    - e. Finish Coat – apply to entire interior concrete surfaces
      - i. Paint: Tnemec Series N140-15BL (Tank White) Pota-Pox Plus, Or Equal
      - ii. Dry Film Thickness: 4.0-6.0 mils DFT
- D. Exterior – Distribution Structure Steel Surface
  - 1. Exterior steel shall be shop finished according to Section 05500. Once structure is installed, exterior steel surfaces of the tank shall be prepared and painted in accordance with the following:
    - a. Surface Preparation - Prepare all areas in accordance with SSPC-SP 11 Power Tool Cleaning to Bare Metal.
    - b. Prime Coat – prime all weld seams according to:
      - i. Paint: Tnemec Series N140-15BL (Tank White) Pota-Pox Plus, Or Equal
      - ii. Dry Film Thickness: 3.0-5.0 mils DFT
    - c. Intermediate Coat – apply to all exterior steel surfaces
      - i. Paint: Tnemec Series N69-color Hi-Build Epoxoline II, Or Equal
      - ii. Dry Film Thickness: 4.0-6.0 mils DFT
    - d. Finish Coat – apply to all exterior steel surfaces
      - i. Paint: Tnemec Series N69-color Hi-Build Epoxoline II, Or Equal
      - ii. Dry Film Thickness: 3.0-5.0 mils DFT
- E. Interior – Distribution Structure Steel Surface
  - 1. Interior steel shall be shop finished according to Section 05500. Once structure is installed, interior steel surfaces of the tank shall be prepared and painted in accordance with the following:
    - a. Surface Preparation - Spot blast all weld seams and all rusted or abraded areas shall be abrasive blast clean all in accordance with SSPC-SP 10 Near White Blast Cleaning.
    - b. Prime Coat – all weld seams according to:
      - i. Paint: Tnemec Series N140-15BL (Tank White) Pota-Pox Plus, Or Equal
      - ii. Dry Film Thickness: 3.0-5.0 mils DFT
    - c. Stripe Coat – apply one coat by brush to all edges, weld seams, nuts and bolts.
      - i. Paint: Tnemec Series N140-39BL (Delft Blue) Pota-Pox Plus, Or Equal
      - ii. Dry Film Thickness: 2.0-3.0 mils DFT
    - d. Intermediate Coat – apply to all interior steel surfaces
      - i. Paint: Tnemec Series N140-1255 (Beige) Pota-Pox Plus, Or Equal
      - ii. Dry Film Thickness: 4.0-6.0 mils DFT
    - e. Finish Coat – apply to all interior steel surfaces
      - i. Paint: Tnemec Series N140-15BL (Tank White) Pota-Pox Plus, Or Equal
      - ii. Dry Film Thickness: 4.0-6.0 mils DFT
- F. CONTRACTOR shall follow all applicable manufacturers' instructions on mixing, environmental issues, application and dry time. Particular attention is called to the Product Data Sheet thinning restrictions necessary to meet ANSI/NSF Standard 61 requirements.
- G. For non-immersion stainless steel, aluminum, and galvanized surfaces, no additional surface preparation or coating is required. For immersion stainless steel, aluminum, and galvanized surfaces, surface preparation shall be in accordance with the paint manufacturer's recommendations and the interior wet coating system shall be applied.

- H. All steel accessories including, but not limited to, influent feedwells, sludge collection mechanisms, structural steel supports, and piping shall receive the preparation and coating specified in paragraph 3.11 above.

END OF SECTION



## SECTION 02734

### SANITARY SEWER MANHOLES

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Factory design and manufacture of manhole sections and accessories.
- B. Quality assurance and control.
- C. Field installation of manholes.
- D. Connection of sewer pipe.
- E. Construction of bench walls and flow channels.
- F. Installation of frames and covers.

##### 1.02 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 01780 - RECORD DOCUMENTS.
- F. Section 02205 - PROTECTION OF EXISTING FACILITIES.
- G. Section 02351 - EXCAVATION, BACKFILL AND TRENCHING.

##### 1.03 REFERENCES

ASTM A48	Gray Iron Castings
ASTM A536	Ductile Iron Castings
ASTM C62	Building Brick
ASTM C90	Hollow Load Bearing Concrete Masonry Units
ASTM C144	Aggregate for Masonry Mortar
ASTM C150	Portland Cement
ASTM C207	Hydrated Lime for Masonry Purposes
ASTM C443	Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gaskets
ASTM C478	Precast Reinforced Concrete Manhole Sections
ASTM D3753	Glass Fiber Reinforced Polyester Manholes

#### 1.04 SUBMITTALS

- A. Submit shop drawings of typical manufactured wall sections and bases proposed for this project, including joint design and related details for field assembly. Include certification of conformance with Contract Documents and the appropriate ASTM Specification.
- B. Submit shop drawings of typical cast iron frames and covers proposed for this project.
- C. Anti-Flotation Design - Structure shall be designed by a registered professional ENGINEER.
  - 1. Design shall include anti-flotation collar to withstand flotation under full hydrostatic head with a 1.25 factor of safety for all manholes.
    - a. 4-Foot Inner Diameter - Flotation collar shall be minimum of 4-inch.
    - b. 5-Foot Inner Diameter - Flotation collar shall be minimum of 6-inch.
    - c. Greater than 5-Foot Inner Diameter - Flotation collar reviewed on a case-by-case basis.
- D. Make submittals prior to start of construction. Make submittals to ENGINEER.

#### 1.05 QUALITY ASSURANCE

- A. Precast reinforced concrete wall sections and bases for manholes shall be manufactured in a plant approved by ENGINEER and the New York State Department of Transportation (NYSDOT) for manufacture of concrete pipe.
- B. Aggregate used in producing concrete shall be from NYSDOT-approved sources.
- C. Completed manholes shall be watertight.

#### 1.06 QUALITY CONTROL INSPECTION

- A. The quality of all materials, the process of manufacture and the finished sections shall be subject to inspection by the ENGINEER. Such inspection may be made at the place of manufacture, and/or at the work site after delivery. Manhole sections shall be subject to rejection if they fail to meet the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be tagged and removed from the job site immediately. All sections which have been damaged after delivery will be rejected, or if already installed, shall be removed and replaced at the CONTRACTOR's expense.
- B. All sections shall be inspected for general appearance, dimensions, soundness, etc. The surface shall be dense, close-textured and free of blisters, cracks, roughness, exposure of reinforcement, damaged joints, and dimensional distortions or other irregularities.
- C. Frames and covers shall be manufactured true to pattern and shall be of uniform quality, free from blowholes, porosity, hard spots, shrinkage distortion or other defects. Covers shall seat uniformly in any position in the frame without rocking.

### PART 2 PRODUCTS

#### 2.01 PRECAST CONCRETE BASES

- A. Design and manufacture of precast concrete bases for manholes shall conform to the requirements of this section and ASTM C478. Bases shall conform to the dimensions indicated on the Drawings, and the horizontal joint at the top of the base shall be compatible with that of the precast wall section.

- B. Precast bases shall be manufactured to contain openings in the wall, of minimum size, to receive the ends of the installed sewer pipe. Openings shall be accurately positioned to conform with line and grade of the connecting sewer.
- C. The top of the manhole base shall extend at least 10 inches above any pipe openings in the base.

## 2.02 MONOLITHIC CAST-IN-PLACE CONCRETE BASES

- A. Cast-in-place concrete bases are not permitted.

## 2.03 PRECAST CONCRETE WALLS AND MANHOLE TOPS

- A. Design and manufacture of precast concrete walls shall conform to the requirements of this section and ASTM C478.
- B. Precast concrete walls shall be made with straight, circular pipe sections and eccentric cone sections if manhole steps are required and concentric cone sections where no steps are required. The total height of precast wall required for each manhole shall be determined in the field, and shall be such that the vertical distance between the top of the assembled precast units and the bottom of the installed cast iron manhole frame is a minimum of 4 inches and a maximum of 12 inches, to allow for grade adjustment rings.
- C. If required, manhole steps shall be cast integrally with or grouted solid into the precast wall units as specified in a later article. Steps shall be positioned to allow the benchwall as the “landing area.” No lifting holes are permitted in the precast units.
- D. All joints in the precast wall, including the joint at the top of the base, shall be made up using either one of the following:
  1. “Snap-On” type O-ring gasket and shall conform to ASTM C443, except that joint taper shall not exceed 3-1/2 degrees. The precast sections shall be provided with a special groove (cast into the male end) to receive and hold the gasket in position during joint assembly.
  2. Two beads of butyl-type rope joint sealant material. Install to manufacturer’s specifications. Barrel mating surfaces shall be clean, dry, and free from grease, oil, dirt, or organic matter to assure a proper watertight seal between seating and butyl rope material.

When using O-ring gaskets, the gap between sections shall be packed on the inside and outside with grout after joint assembly. The grout shall be A-H Axpandcrete by Anti-Hydro, Masterflow 713 Plus by Degussa, or Five Star® Grout by Five Star Products, Inc., or equal, and shall be troweled smooth so that no projections remain on the inside. There shall be concrete to concrete bearing between the various sections, and the gasket shall not support the weight of the section.
- E. If required, precast reinforced concrete slab tops for manholes shall be manufactured in accordance with ASTM C478, except that thickness and reinforcing shall be as shown on the Drawings. Openings shall be of the proper diameter to receive the frame specified. Slab tops shall be set in a full bed of mortar.
- F. Manhole tops shall be cast with four threaded inserts to accommodate frame hold-down bolts.

## 2.04 FRAMES AND COVERS

- A. Frames and covers shall be of the make, style, opening, height, weight, and other designation specified herein or shown on the Drawings.
- B. Material shall be gray cast iron conforming to ASTM A48, Class 30; or shall be ductile cast iron conforming to ASTM A536, Grade 60-40-18.

- C. Unless otherwise scheduled, frames and covers shall be heavy duty, non-penetrating pickhole type of non-rocking design, and shall have machined bearing surfaces to prevent rocking and rattling under traffic loads. Covers shall have cast- in, 1-1/2-inch wide, raised letters, the words "THICKENER-CLARIFIER OVERFLOW."
- D. Unless otherwise noted, all manhole covers shall be self sealing and shall be furnished with O-ring rubber gaskets.
- E. Surface finish shall be smooth and well cleaned by shot blasting or by some other approved method.
- F. Frames and covers shall have clear opening of 24-inch diameter.
- G. Rubber gasketed lids shall be installed on all manholes into which pressure sewer discharges and all meter pit manholes.
- H. Acceptable manufacturers and pattern numbers for self-sealing frames and covers are:
  - 1. Neenah Foundry Company; Pattern R-1642.
  - 2. Syracuse Casting Company; Pattern 1030.

## 2.05 MANHOLE STEPS

- A. Manhole steps are to be provided in manholes during the casting process. Steps are to be installed into the precast units at intervals of 12 inches. Steps shall be in conformance with OSHA requirements having drop front or equivalent. Bolted-on types are not acceptable. Manhole steps to be PS2-PF by M.A. Industries, Inc. or equal.

## 2.06 GRADE RINGS

- A. General - Grade adjustment for a manhole shall not exceed 12 inches.
- B. Precast Concrete Grade Rings - Precast concrete grade rings for leveling units shall be manufactured in compliance with the requirements of the Specifications for Precast Reinforced Concrete Manhole Sections, ASTM C478; and shall be as thick as necessary to provide the required grade adjustment but not less than 3 inches in height. Split grade rings are unacceptable. Broken or cracked concrete grade rings will not be acceptable.
- C. Rubber Grade Rings
  - 1. Rubber grade rings (rubber adjustment riser) for leveling units shall comply with the following:

PHYSICAL PROPERTIES	TEST RESULTS	TEST METHOD
Density	$\pm 1.098 \text{ g/cm}^3$	ASTM C642-90
Durometer Hardness <ul style="list-style-type: none"> <li>• Molded surface</li> <li>• Interior surface</li> </ul>	$75A \pm 10$ points $73A \pm 10$ points	Based on ASTM D2240
Tensile strength	1.6 MPa (232 psi) (not less than 1 MPa)	ASTM D412-87
Compression deformation <ul style="list-style-type: none"> <li>• Initial deformation</li> <li>• Final deformation</li> </ul>	Under 1 MPa (145 psi) $6 \pm 4$ percent $6 \pm 4$ percent	Based on ASTM D575
Compression set	0.4 percent (no more than 4 percent) under 1 MPa (145 psi)	Based on ASTM D395
Freeze and thaw when exposed to deicing	No loss after 50 cycles	ASTM C672-91

PHYSICAL PROPERTIES	TEST RESULTS	TEST METHOD
chemicals		
Coefficient of thermal expansion	1.08 x 10 <sup>-4</sup> mm/mm/°C (6 x 10 <sup>-5</sup> in/in/°F)	ASTM C531-85
Weathering (70 hours at 70 degrees C) Hardness retained Compressive strength retained Tensile strength retained Elongation retained	100 ± 5 percent 100 ± 5 percent 100 ± 5 percent 100 ± 5 percent	ASTM D573-88

2. Rubber grade rings shall only be used in paved areas.
3. Tapered rubber grade rings shall be used to accommodate sloped paved surfaces.

## 2.07 CEMENT GROUT

- A. Cement grout shall be non-shrink, non-metallic.
- B. Use Type I cement where grout is not in contact with sewage.

## 2.08 EPOXY BONDING COMPOUND

- A. Provide a high modulus, low viscosity, moisture insensitive epoxy adhesive having the following characteristics:
  1. Mix Ratio - 200 percent solids, two-component, mixed one part by volume component B to two parts by volume component A.
  2. Ultimate Compressive Strength - 13,000 psi after cure at 73 degrees F and 50 percent relative humidity determined in accordance with ASTM D695.
  3. Acceptable Manufacturers
    - a. Sika Corporation, Sikadur Hi-Mod.
    - b. A.C. Horn, Inc., Epoxitite Binder.
    - c. Euclid Chemical Company, 452 Epoxy System.

## 2.09 PIPE SEALS

- A. Connections between manholes and pipes shall be made with flexible rubber sleeves in the manufactured sizes available, with stainless steel straps and bolts. Elastomeric waterstop gaskets are not permitted. Provide an elastomeric waterstop gasket around exterior of all plastic polyethylene or PVC pipe, and where sleeve sizes are not commercially available either due to the size of pipe or due to outside diameter not allowing proper sleeve fit.
- B. Openings in manholes for 8-inch piping shall be as follows:
  1. Influent Pipe Slope Less Than 6 Percent - Use 11-inch diameter boot.
  2. Influent Pipe Slope 6 to 12 Percent - Use 12-inch diameter boot.
  3. Influent Pipe Slope Greater Than 12 Percent - Use 13-inch diameter boot.
- C. The ends of the pipe shall be accurately positioned in the openings, properly secured against movement, and the remaining annular space between the pipe wall and the base completely packed with A-H Axpandcrete by Anti-Hydro, Masterflow 713 Plus by Degussa, or Five Star® Grout by Five Star Products, Inc., or equal. Before the grout has set, the CONTRACTOR shall recheck invert elevations of the ends of the pipe, and perform any adjustments which are necessary to establish the required line and grade of the sewer.

## 2.10 CAST-IN-PLACE CONCRETE

- A. Cast-in-place concrete used in constructing manhole bench walls shall be in accordance with Section 03300.

## 2.11 WATERPROOFING

- A. The CONTRACTOR shall furnish manholes waterproofed over the entire exterior surface that will be below finished grade. The waterproofing shall not mar or interfere with the specified exterior finish for these structures. Waterproofing shall be accomplished prior to structure installation for precast sections, and shall be applied to dry surfaces under proper weather conditions.
- B. Waterproofing shall consist of a two-coat application of coal tar compound as manufactured by Koppers Bitumastic Super Service Black; Tnemec Heavy Duty Black 46-449; Preco Nitoproof 600; or equal, and shall be applied according to manufacturer's specification. Total thickness of the two-coat application shall not be less than 16 mils.

# PART 3 EXECUTION

## 3.01 EXAMINATION

- A. Verify that subgrade elevations for manhole bases are correct and excavation is dewatered.
- B. Verify that rejected (tagged) units have been removed from the site.

## 3.02 PREPARATION

- A. Provide foundation mat of run-of-crusher stone per Section 02351 to support manhole base. Mat shall be 12 inches minimum depth and shall bear on sound undisturbed earth; excavate and remove subgrade material as necessary to reach sound stratum.
- B. Mat diameter shall be a minimum of 2 feet greater than outside diameter of manhole base, and shall be compacted to a uniform, level surface.

## 3.03 INSTALLATION

- A. Manholes
  1. Precast base shall be accurately located and uniformly supported on the foundation mat in a level position.
  2. Install required manhole wall sections in properly oriented position; follow manufacturer's instructions for joining together each section using the "snap-on" O-ring gasket joint. Pack joints with grout.
  3. All precast units shall be laid-up plumb and level to form a vertical manhole structure at each location.
  4. When grade adjustment exceeds 12 inches, barrel sections corresponding to the manhole diameter shall be used.
- B. Pipe Seals - Connect ends of sewer pipe to manholes with flexible rubber sleeves, straps and bolts, as shown on Drawings and specified in Article 2.09.

C. Channels and Benches

1. Construct flow channels and bench walls in bottom of manholes, shaped to follow details on the Drawings. Flow channels shall match inverts and size of pipes, creating a channel of gradual slope and curvature such that smooth, uninterrupted flow through the manhole is assured. Extend channel wall vertically up to top of highest (flowing) pipe so as to form the bench wall. Bench surface shall extend horizontally to manhole walls, with slight pitch toward flow channel.
2. Flow channels and bench walls shall be constructed of cast-in-place concrete, although half-sewer pipe sections may also be utilized to form portions of the flow, channel. All exposed concrete surfaces shall receive a steel troweled finish except horizontal surface of bench walls shall then be brushed finished.

D. Grade Rings

1. Furnish and install grade rings at manhole top so as to adjust and support cast iron frame to finished grade, in accordance with requirements of Article 2.06.
2. When grade adjustment of less than 3 inches is required, rubber grade rings shall be used.
3. Joints between precast concrete grade rings for leveling units shall be made with two-bead preformed plastic sealing compound and shall be 1/2-inch thick and troweled or trimmed smooth on the inside of the manhole. In addition, the leveling units shall be sealed on the outside surface using non-shrink grout.
4. Joints between rubber grade rings and rubber precast concrete grade rings or frame shall be made with polyurethane marine sealant compound.
5. The joint between the bottom of the frame and the top of precast concrete grade rings, or the top manhole section as applicable, shall be made with preformed plastic sealing compound and shall be sealed on the outside surface using non-shrink grout.

E. Frames and Covers

1. Frames and covers shall be firmly seated on two rings of bitumastic rope and be positioned to conform to the adjacent finished grade, or to the specific elevation shown on the Drawings.
2. Frames to be set parallel to surface slopes.
3. Covers shall seat uniformly in any position in the frame without rocking.
4. In pavements and shoulder areas, set frame 1/2 inch below finished grade.
5. In unpaved areas such as easements and rights-of-way, attach frame to manhole using four stainless steel bolts, nuts, and washers. If threaded inserts are not provided with manhole top, furnish and install bolts using epoxy bonding compound.

3.04 BACKFILLING

- A. Carry out backfilling operations in conformance with Section 02351, being careful to provide full support under connecting pipes using compacted bedding material specified for the sewer piping.

3.05 ACCEPTANCE TESTING

- A. Manholes shall be watertight. All visible leaks shall be permanently sealed in an approved manner. Repair of manhole sections using grout, either cementitious or polyurethane, is not permitted. Leakage tests of manholes can be performed in conjunction with leakage tests of connecting sewers under Section 02735.

END OF SECTION

## SECTION 02820

### ASBESTOS REMOVAL

#### PART 1 GENERAL

##### 1.01 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.

##### 1.02 RELATED SECTIONS

- A. Section 01010 - SUMMARY OF WORK.

##### 1.03 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.

#### 1.04 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.

#### 1.05 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.

1.06 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.
- 1.07 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, ENGINEER, 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.
- 1.08 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.

1.09 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

### 2.01 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.

## 2.02 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.

## 2.03 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.

#### 2.04 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.

#### 2.05 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.

#### 2.06 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.

#### 2.07 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.

#### 2.08 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

### 3.01 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.

### 3.02 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.

### 3.03 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.

#### 3.04 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.

#### 3.05 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.

#### 3.06 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.

3.07 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.

3.08 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.

3.09 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 02900

### RESTORATION

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. Work Specified - The work specified shall include all labor, material, equipment, services and incidentals necessary to restore surfaces, pavements, sidewalks, driveways, curbs, gutters, 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 01331 - SHOP DRAWING PROCEDURES.
  - 2. Section 02110 - SITE CLEARING.
  - 3. Section 02316 - SELECT GRANULAR MATERIALS.
  - 4. Section 02351 - EXCAVATION, BACKFILL, AND TRENCHING.
  - 5. Section 02480 - LANDSCAPING RESTORATION.
  - 6. Section 02698 - UNDERGROUND PROCESS PIPING.

##### 1.02 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 (NYSDOT) Standard Specifications, latest revision.

##### 1.03 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.
  - 4. Mix designs for asphalt.

##### 1.04 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 one 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

### 2.01 SOIL AND SEEDING 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 NYSDOT 713-04 standard specifications for germination and purity.
- D. Seed Mixtures:

Specia	Lawn Areas <sup>(1)</sup>	Non-Maintained Areas <sup>(1)</sup>
Kentucky Blue Grass	50	20
Chewing Red Fescue	20	20
Manhattan or Pennfine Ryegrass	30	60

(1) Percent by weight.

- E. Mulch shall be stalks of oats, wheat, rye or other acceptable crops which are free from noxious weeds.

### 2.02 PAVING MATERIALS

- A. Paving Materials - The source and gradation of materials shall be acceptable to the ENGINEER. Materials shall conform to Section 02510.
- B. Concrete Materials - Concrete used for road bases, roads, driveways, sidewalks, curbs, or similar items shall be NYSDOT Class HP concrete mix.

### 2.03 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

### 3.01 INSTALLATION

#### A. Temporary Pavement

1. Immediately upon completion of backfilling of the trench or excavation, the CONTRACTOR shall place a temporary pavement over all disturbed areas of streets, driveways, sidewalks, and other traveled places where the original surface has been disturbed as a result of his operations.
2. The temporary pavement shall consist of compacted select backfill surfaced with cold patch to such a depth as required to withstand the traffic to which it will be subjected.
3. The surface of the temporary pavement shall conform to the slope and grade of the area being restored.
4. For dust prevention, the CONTRACTOR shall treat all surfaces, not covered with cold patch, as frequently as may be required.
5. The temporary pavement shall be maintained by the CONTRACTOR in a safe and satisfactory condition until such time as the permanent paving is completed. The CONTRACTOR shall immediately remove and restore all pavement as shall become unsatisfactory.

#### B. Permanent Pavement Replacement - The permanent and final re-paving of all streets, driveways and similar surfaces where pavement has been removed, disturbed, settled or damaged by or as a result of performance of the Contract shall be repaired and replaced by the CONTRACTOR, by a new and similar pavement, consisting of base, binder, and/or top courses each having the same depth as existing pavement or as required by the local community or Highway Permit.

1. The top surface shall conform with the grade of existing adjacent pavement and the entire replacement shall meet the current specifications of the local community for the particular types of pavement.
2. Where the local community has no specification for the type of pavement, the work shall be done in conformity with the NYSDOT standard, which conforms the closest to the type of surfacing being replaced, as determined by the ENGINEER and with the following specifications:
  - a. Unless specified otherwise, replacement of existing roads under the jurisdiction of New York State, counties, or cities shall be constructed to the following requirements:
    - 1) Pavement subbase as outlined under Section 02316.
    - 2) Base Course Pavement – 8 inches minimum compacted thickness or combination of concrete base where encountered.
    - 3) Binder Course Pavement - 2 inches minimum compacted thickness.
    - 4) Surface Course Pavement – 1-inch minimum compacted thickness.
  - b. Unless specified otherwise, replacement of existing roads under the jurisdiction of towns or villages shall be constructed to the following requirements:
    - 1) Pavement subbase as outlined under Section 02510.
    - 2) Binder Course Pavement - 2 inches minimum compacted thickness.
    - 3) Surface Course Pavement – 1-1/2 inches minimum compacted thickness.
3. All required permits for local governing bodies shall be obtained.
4. Install or reinstall pavement striping in accordance with NYSDOT Standard Specifications.

#### C. Preparation for Permanent Pavement

1. When scheduled and within the time specified, the temporary pavement shall be removed and base prepared, at the depth required by the local community or Highway Permit, to receive the permanent pavement.
  - a. The base shall be brought to the required grade and cross-section and thoroughly compacted before placing the permanent pavement.

- b. Any base material which has become unstable for any reason shall be removed and replaced with compacted base materials.
    - c. Cuts which are not straight will require another saw-cutting further from the trench. Additional select backfill and pavement needed for restoration outside the defined pay limits will be installed and paid for by the CONTRACTOR.
  - 2. Prior to placing the permanent pavement, all service boxes, manhole frames and covers and similar structures within the area shall be adjusted to the established grade and cross-section.
  - 3. The edges of existing asphalt pavement shall be cut a minimum of 1 foot beyond the excavation or disturbed base whichever is greater.
    - a. All cuts shall be parallel or perpendicular to the centerline of the street.
    - b. All cuts will be made in straight continuous lines by saw cutting or other acceptable technique.
    - c. An additional 1-foot saw cut may be required for top course if shown on the Drawings or required by permit.
  - 4. Install or reinstall traffic inductance loops in accordance with NYSDOT Standard Specifications by a firm which is qualified by the NYSDOT.
- D. Bituminous Tack Coat
  - 1. The tack coat shall be uniformly applied by a pressure distributor to a prepared clean pavement. The tack coat shall be applied as approved by the ENGINEER to offer the least inconvenience to traffic and to permit one-way traffic, where practical, to prevent pickup or tracking of the bituminous material.
  - 2. Tack coat shall not be applied on a wet pavement surface or when the surface temperature is below 45 degrees F. The temperature and areas to be treated shall be approved by the ENGINEER prior to application. The application rate shall be 0.03 to 0.07 gallons per square yard as approved by the ENGINEER.
- E. Asphalt Pavement
  - 1. The permanent asphalt pavement replacement for streets, driveways and parking area surfaces shall be replaced with bituminous materials of the same depth and kind as the existing unless otherwise specified.
  - 2. Prior to placing of any bituminous pavement tack coat shall be applied to the edges of the existing pavement and other features.
  - 3. The furnishing, handling and compaction of all bituminous materials shall be in accordance with the NYSDOT Standard Specifications, latest edition.
- F. Cold Milling
  - 1. Cold milling of existing surfaces shall follow NYSDOT Standard Specifications, latest edition.
  - 2. Material removed during the milling process will become the property of the CONTRACTOR and shall be disposed of at an acceptable location off site.
  - 3. CONTRACTOR must maintain drainage into all gutters and catch basins during the milling operation.
- G. Concrete Pavement and Pavement Base
  - 1. Concrete pavements and concrete bases for asphalt, brick or other pavement surfaces shall be replaced with NYSDOT Class HP concrete.
  - 2. Paving slabs or concrete bases shall be constructed to extend 1 foot beyond each side of the trench and be supported on undisturbed soil. Where such extension of the pavement will leave less than 2 feet of original pavement slab or base, the repair of the pavement slab or base shall be extended to replace the slab to the original edge of the pavement or base unless otherwise indicated on the Contract Drawings.
  - 3. Where the edge of the pavement slab or concrete base slab falls within the excavation, the excavation shall be backfilled with select backfill compacted to 95 percent maximum dry density as determined by ASTM D698 up to the base of the concrete.

4. The new concrete shall be of the same thickness as the slab being replace and shall contain reinforcement equal to the old pavement.
  - a. New concrete shall be placed and cured in accordance with the applicable provisions of NYSDOT standards.
  
- H. Stone or Gravel Pavement - All pavement and other areas surfaced with stone or gravel shall be replaced with material to match the existing surface unless otherwise specified.
  1. The depth of the stone or gravel shall be at least equal to the existing or at least 6 inches.
  2. After compaction, the surface shall conform to the slope and grade of the area being replaced.
  3. Stone material used shall comply with the NYSDOT Standard Specifications, latest edition.
  
- I. Driveways
  1. Asphalt Driveways
    - a. After the water main has been installed and the trench properly backfilled, the CONTRACTOR shall cut back the drive 1 foot each side of the trench. The asphalt shall be cut with carborundum saw or other device to give a uniform and continuous straight edge. Where water mains or service piping are installed under drive aprons, the ENGINEER may specify the replacement of the entire apron and the CONTRACTOR shall remove and replace same to its base.
    - b. The cut edge shall be painted with a bituminous seal coat and asphalt shall then be replaced to equal or exceed the existing asphalt in quality and depth.
      - 1) In no case shall the finished thickness of the asphalt driveway be less than 4 inches, a minimum of 3 inches of binder and 1 inch of top to match the existing driveway.
      - 2) Courses shall be laid in 1-inch lifts and compacted with a minimum 2-ton roller or other mechanical means specified by the ENGINEER.
      - 3) If the existing drive was in the opinion of the ENGINEER recently sealed, then the CONTRACTOR shall apply one coat of coal tar emulsion sealer over the top lift. In no case shall cold patch be considered pavement, but may be used temporarily as an expedient, the cost of which will be borne by the CONTRACTOR.
  2. Concrete Driveways
    - a. The CONTRACTOR shall be responsible for the proper consolidation of the sub-grade before laying the new driveway, and any settlement or failure of the new driveway shall be repaired or replaced by the CONTRACTOR to the satisfaction of the ENGINEER.
    - b. Where drives are encountered, the CONTRACTOR shall cut the concrete each side of the trench limits using a concrete saw at breaks in the drive or at expansion joints at the direction of the ENGINEER. Any concrete broken beyond the cut or break line will be replaced at the CONTRACTOR'S expense.
    - c. The drive shall then be replaced to equal or exceed the existing drive in quality and depth.
      - 1) Reinforcing shall be installed in all replacements, tying it to existing reinforcing where it protrudes from the cut edge. 6 x 6 x 6 welded wire mesh or equal shall be used. The CONTRACTOR shall then install transit mix concrete meeting NYSDOT specifications to the depth of the original base, or a minimum of 6 inches, whichever is more.
      - 2) The surface shall be finished to match the existing surface. The CONTRACTOR shall properly cure all concrete after placing and shall protect it from damage from all types of traffic and harm prior to final setting.
  
- J. 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 lbs. 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 lbs. 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.

K. 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.

L. 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 AAN.
2. Watercourses 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 water course 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.

M. 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.

N. Tree Plantings

1. Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as require, 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

##### 1.01 SECTION INCLUDES

- A. This Section specifies cast-in place concrete, formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.

##### 1.02 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. 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.



### 1.03 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."

## PART 2 PRODUCTS

### 2.01 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.

## 2.02 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615 Grade 60, deformed.
- B. Welded Wire reinforcement: ASTM A1064, flat sheets.

## 2.03 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.

## 2.04 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.

## 2.05 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.

## 2.06 WATERSTOPS

- A. Hydrophilic waterstops shall be 1-inch wide by 3/4-inch thick strips of chloroprene or butyl rubber and mastic. Waterstops shall be Hydrotite by Greenstreak/Sika, Earth Shield type 20 by JP Specialties, Inc., 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. Murphy: Paul Murphy Plastics Co.
    - c. Vinylex Corporation.

## 2.07 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.
  - 1. Products:
    - a. Diamond Clear VOX; Euclid Chemical Co.
    - b. Vocomp-20; W. R. Meadows, Inc.
    - c. MasterKure CC 200 WB; BASF Corporation.
    - d. Approved equal
- F. Evaporation Retarder: Subject to compliance with requirements, provide one of the following:
  - 1. Products:
    - 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.

## 2.08 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: 2 Component Epoxy Bonding and Anticorrosion Agent: Product that consists of water-insensitive epoxy adhesive 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.
  - 3. Manufacturer: MasterEmaco ADH 326 by BASF or approved equal.

## 2.09 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): 4,500 psi.
  - 2. Slump: 3-1/2 inches  $\pm$  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.
- 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  $\pm$  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: 0.40 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

## 3.01 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 Contract 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.
- 3.02 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.
- 3.03 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.
- 3.04 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 reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.
- 3.05 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.
- 3.06 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 abonding 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 Section 02523, "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.
- 3.07 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 placed, 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 305.1 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.

### 3.08 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.

### 3.09 FINISHING FLOORS AND SLABS

- A. General: Comply with recommendations in ACI 302.1R for screeding, restraighening, 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. Do not finish while bleed water is still being released from concrete. 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. Only magnesium trowels shall be used on exterior slabs. 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 unlevelled 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.

### 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 03411  
STRUCTURAL PRECAST CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDE

- A. Precast concrete panels.
- B. Connection and supporting devices.
- C. Coping.

1.02 REFERENCES

- A. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary; American Concrete Institute International.
- B. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel.
- C. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- D. ASTM A 416/A 416M - Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.
- E. ASTM C 150 - Standard Specification for Portland Cement.
- F. AWS D1.1 - Structural Welding Code - Steel; American Welding Society.
- G. AWS D1.4 - Structural Welding Code - Reinforcing Steel; American Welding Society.
- H. PCI MNL-116 - Manual for Quality Control for Plants and Production of Structural Precast Concrete Products; Precast/Prestressed Concrete Institute.
- I. PCI MNL-120 - PCI Design Handbook - Precast and Prestressed Concrete; Precast/Prestressed Concrete Institute.
- J. PCI MNL-123 - Design and Typical Details of Connections for Precast and Prestressed Concrete; Precast/Prestressed Concrete Institute.
- K. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction; Precast/Prestressed Concrete Institute.

1.03 DESIGN REQUIREMENTS

- A. Conform to ACI 318 and Building Code for design load and construction requirements applicable to work of this section.
- B. Design components to withstand dead loads and design loads in the configuration indicated.
  - 1. Calculate structural properties of framing members in accordance with ACI 318.

- a. Minimum 28-day compressive strength ( $f'_c$ ) of 5,000 psi.
  - 2. Load Characteristics
    - a. Environmental Loads (Wind, Seismic, Snow, etc.): Per New York State Building Code.
    - b. Self-weight: as determined by precast manufacturer.
    - c. Existing Panel Loads: See as built Erie County Water Authority Contract No. 22 D for existing panels to be supported.
  - C. Design members exposed to the weather shall provide for movement of components without damage, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to seasonal or cyclic day/night temperature ranges.
  - D. Design system shall accommodate construction tolerances, deflection of other building structural members and clearances of intended openings.
- 1.04 SUBMITTALS
- A. Product Data: Indicate standard component configurations, design loads, deflections, cambers, design calculations, and bearing requirements.
  - B. Shop Drawings:
    - 1. Indicate layout, unit locations, fabrication details, unit identification marks, reinforcement, connection details, support items, dimensions, Contractor-verified openings, and relationship to adjacent materials.
    - 2. Indicate design loads, deflections, cambers, bearing requirements, and special conditions.
    - 3. Elevation views and insulation properties for all precast panels.
    - 4. Shop drawings shall be signed and sealed by a Professional Structural Engineer experienced in design of precast concrete and licensed in New York State. Submittals shall be submitted to the ENGINEER.
  - D. Samples: Submit two, 12-inch by 12-inch in size, illustrating surface finish treatment.
- 1.05 QUALITY ASSURANCE
- A. Perform work of this section in accordance with requirements of PCI MNL-116, PCI MNL-120, PCI MNL-123, and PCI MNL-135.
  - B. Fabricator Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten (10) years of documented experience.
  - C. Erector Qualifications: Company specializing in erecting products of this section with minimum ten (10) years of documented experience.
  - D. Design precast concrete members under direct supervision of a Professional Structural Engineer experienced in design of precast concrete and licensed in New York State. Include loads from roof system and design embedded plates and steel anchors for support of wall panels where required.
  - E. Welder: Qualified within previous 12 months in accordance with AWS D1.1 and AWS D1.4.

## 1.06 PRE-INSTALLATION MEETING

- A. Convene a pre-installation conference one week prior to commencing work of this section.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Precast Concrete:
  - 1. Kistner Concrete Products, Inc.
  - 2. Lakelands Concrete Products, Inc.
  - 3. Approved equal.

### 2.02 MATERIALS

- A. Cement: Portland, conforming to ASTM C150, Type II A.
- B. Aggregate, Sand, Water, Admixtures: Determined by precast fabricator as appropriate to design requirements and PCI MNL-116.
- C. Reinforcing Steel: ASTM A615/A615M Grade 60, Deformed steel bars.
- D. Welded Steel Wire Fabric: ASTM A1064, Plain type.
- E. Waterproof Coating: Manufacturer's standard.

### 2.03 FABRICATION

- A. Conform to fabrication procedures specified in PCI MNL-116.
- B. Maintain plant records and quality control program during production of precast members. Make records available upon request.
- C. Ensure reinforcing steel, anchors, inserts, plates, angles, and other cast-in items are embedded and located as indicated on shop drawings. Any anchors not fully embedded at the completion of the structure shall conform to galvanized steel conforming to Section 05120.

### 2.04 FINISHES

- A. Ensure exposed-to-view finish surfaces of precast concrete members are uniform in color and appearance. Color and texture shall match existing precast concrete.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that Site conditions are ready to receive work and field measurements are as shown on shop drawings.

### 3.02 PREPARATION

- A. Prepare support equipment for the erection procedure, temporary bracing, and induced loads during erection.

### 3.03 ERECTION

- A. Erect members without damage to structural capacity, shape, or finish of new or existing construction. Replace or repair damaged members.
- B. Align and maintain uniform horizontal and vertical joints, as erection progresses.
- C. Maintain temporary bracing in place until final support is provided. Protect members from staining.
- D. Secure units in place. Perform welding in accordance with AWS D1.1.

### 3.04 ERECTION TOLERANCES

- A. Erect members level and plumb within allowable tolerances.
- B. Conform to PCI MNL-135 for erection tolerances.

### 3.05 CLEANING

- A. Clean weld marks, dirt, or blemishes from surface of exposed members.

END OF SECTION



## SECTION 03600

### GROUT

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. This Section includes the minimum requirements of grout used for equipment bases, pipe supports, and anchor rods/bolts including, but not limited to, the following:
  - 1. Non-shrink, epoxy type.
  - 2. Non-shrink, non-metallic cementitious type.

##### 1.02 RELATED SECTIONS

- A. Section 03300 - Cast-In-Place Concrete.
- B. Division 11 - Equipment.
- C. Division 15 - Mechanical.

##### 1.03 REFERENCES

- A. Comply with applicable provisions and recommendations of the following, except as otherwise specified.
  - 1. ASTM C78, Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
  - 2. ASTM C 144, Aggregate and Masonry Mortar
  - 3. ASTM C 150, Portland Cement
  - 4. ASTM C 109, Compressive Strength of Hydraulic Cement Mortars (using 2-inch or 50 mm Cube Specimens).
  - 5. ASTM C 191, Time of Setting of Hydraulic Cement by Vicat Needle.
  - 6. ASTM C476, Standard Specification for Grout for Masonry.
  - 7. ASTM C531, Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
  - 8. ASTM C579, Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
  - 9. ASTM C580, Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
  - 10. ASTM C881, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
  - 11. ASTM E488, Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.
  - 12. CRD-C-5898, Specifications for Non-Shrink Grout.

#### 1.04 QUALITY ASSURANCE

- A. Perform work in accordance with applicable ACI model code.

#### 1.05 SUBMITTALS

- A. Shop Drawings:
  - 1. Submit copies of manufacturer's specifications and installation instructions for all materials.
- B. Reports and Certificates:
  - 1. For proprietary materials, submit copies of reports on quality control tests.
  - 2. For nonproprietary materials, submit certification that materials meet specification requirements.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. The following shall be used for grout work where otherwise unspecified:
  - 1. Non-shrink, epoxy type grout shall be Masterflow 648 CP Plus by Degussa Building Systems, Euclid Chemical, or approved equal.
  - 2. Non-shrink, non-metallic cementitious grout shall be Masterflow 928 by Degussa Building Systems, Z-Crete, or approved equal.

#### 2.02 MATERIALS

- A. Non-shrink, epoxy type grout for applications including anchor rods/bolts.
  - 1. Grout shall be a non-shrink, high-performance, three-component, 100 percent solids, moisture tolerant, high strength, modified epoxy resin-based grout.
  - 2. Grout shall conform to current ASTM C881 specifications.
  - 3. Grout shall have the following minimum property values in accordance with test standard:
    - a. 7-day compressive strength: 15,500 psi (ASTM C579).
    - b. 28-day compressive strength: 17,500 psi (ASTM C579).
    - c. Flexural strength: 5,000 psi (ASTM C580).
    - d. Tensile bond strength to steel: 3,000 psi (ASTM C531).
    - e. Shear bond strength to steel: 4,000 psi (ASTM C531).
- B. Non-shrink, non-metallic cementitious grout for structural applications including bearing plates and base plates.
  - 1. Grout shall have the following minimum property values in accordance with test standard:
    - a. 28-day compressive strength (flowable state): 8,000 psi (ASTM C476).

- b. 28-day flexural strength (flowable state): 1,150 psi (ASTM C 78).
- c. Design stress 2,275 psi (ASTM E 488).

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. CONTRACTOR shall, prior to placing grout, inspect all areas to be grouted to ensure that no defects exist that may inhibit the intended use of the grout. If such conditions occur, CONTRACTOR shall make notice to the ENGINEER and proceed only when directed by the ENGINEER.

### 3.02 PREPARATION

- A. Prior to placing grout, CONTRACTOR shall clean concrete surfaces of dirt, dust, laitance, corrosion, or other contamination; wire brush; using potable water, rinse surface and allow it to dry.

### 3.03 INSTALLATION

- A. General:
  - 1. Place grout as shown on the Contract Drawings and in accordance with manufacturer's instructions. If manufacturer's instructions conflict with the Specifications do not proceed until ENGINEER provides clarification.
  - 2. Manufacturers of proprietary products shall make available upon 72 hours notification the services of a qualified, full-time employee to aid in assuring proper use of the product under job conditions.
  - 3. Placing grout shall conform to temperature and weather limitations as specified by the manufacturer.
  - 4. Equipment base grouting shall be conducted to ensure no voids exist under bases. Grout shall be worked from one end of the base to the other. On large bases, stand pipes, grout holes, and vents shall be provided to ensure base is properly grouted.

END OF SECTION

SECTION 04300  
UNIT MASONRY SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hollow and solid load bearing block units.
- B. Factory pre-mixed (including sand) mortar.
- C. Grout.
- D. Reinforcement, anchorage, and accessories.
- E. Preconstruction materials testing.
- F. Preconstruction meeting.

1.02 RELATED SECTIONS

- A. Section 03300 - CONCRETE.
- B. Section 05500 - MISCELLANEOUS FABRICATIONS.

1.03 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.

#### 1.04 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 3.01.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 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.
- C. 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.
- D. 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.
- E. Line diagrams of shapes and sizes for all masonry units on the job.

#### 1.05 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.

#### 1.06 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.

#### 1.07 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.

## 1.08 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.

## 1.09 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 1.02 of this specification.

# PART 2 PRODUCTS

## 2.01 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.

## 2.02 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.

## 2.03 MANUFACTURERS – FACE BRICK UNITS

- A. Glen-Gery Corporation, Wyomissing, PA.
- A. The Belden Brick Company, Canton, OH.
- B. Watson Town Brick Company, Watsontown, PA
- C. Or equal.

## 2.04 FACTORY PREMIX MORTAR

- A. Field mix mortar is not allowed.
- A. Factory premixed mortar composed of mortar cement for load-bearing and reinforced masonry per Table 2 of ASTM C270, Type S property.
- B. Factory premixed mortar for non-load-bearing masonry veneers per Table 2 of ASTM C270, Type N property.
- C. Mortar Color - ASTM C979, Mineral oxide pigment; color as selected by ENGINEER; manufactured by Solomon Grind-Chem Service, Inc.; Davis Colors; or equal.
- D. Antifreeze compounds are prohibited.
- E. Admixtures containing chlorides are prohibited.
- F. 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.



## 2.05 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.

## 2.06 MANUFACTURERS - REINFORCEMENT, ANCHORAGE, FLASHINGS, AND ACCESSORIES

- A. Dur-O-Wal, Inc.; Hohmann & Barnard, Inc.; or equal.

## 2.07 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

COMPONENT	DUR-O-WALL ITEM	HOHMAN & BARNARD ITEM
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, polypropylene, 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.

2.08 MANUFACTURERS – ADMIXTURES AND COATINGS FOR CONCRETE MASONRY UNITS AND MORTAR

- A. Grace Construction Products, Cambridge, MA.
- C. BASF Corporation, Shakopee, MN.
- D. Or equal.

2.09 ADMIXTURES AND COATINGS FOR CONCRETE MASONRY UNITS AND MORTAR

- A. Water-Resistive Admixture For Concrete Masonry Veneer Units - DRY-BLOCK Block Admixture by Grace, MasterPel 240 by BASF, or equal.
- B. Water Permeance Rating of Concrete Masonry Veneer – Class E per ASTM E514-74.

## PART 3 EXECUTION

### 3.01 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 br 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](mailto: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. CONTRACTOR shall 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.

### 3.02 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.

### 3.03 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.

### 3.04 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.

### 3.05 TOLERANCES

- A. Site tolerances per ACI 530.1 apply, with the following exceptions:

Dimension of Elements	
Mortar Joint Thickness	
Head	$\pm 1/8$ inch
Collar	$\pm 1/8$ inch
Grout space or cavity width or per unit manufacturer's recommendation (for glazed masonry units)	$-1/4$ inch, $+ 3/8$ inch

### 3.06 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.

### 3.07 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.

### 3.08 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.

### 3.09 CAVITY AND SINGLE WYTHER 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 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 too 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.

### 3.17 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.

### 3.18 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.

### 3.19 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 05120  
STRUCTURAL STEEL

PART 1     GENERAL

1.01     SECTION INCLUDES

- A.     This Section includes the requirements of fabrications comprised of structural steel shapes, plate, pipe, sheet, and tubing including, but not limited to:

1.     Steel structures.

1.02     REFERENCES

- A.     Comply with applicable provisions and recommendations of the following except as otherwise shown or specified within the Contract Documents:

1.     ASTM A36, Structural Steel.
2.     ASTM A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3.     ASTM A123, Structural Shapes, Plates, Bars, and Fabricated Assemblies.
4.     ASTM A153, Hardware and Threaded Components.
5.     ASTM A194 Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
6.     ASTM A500, Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
7.     ASTM A563, Standard Specification for Carbons and Alloy Steel Nuts.
8.     ASTM A572, High-Strength, Low-Alloy, Columbian-Vanadium Steels of Structural Quality.
9.     ASTM A992, Standard Specification for Structural Steel Shapes.
10.    ASTM F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105 ksi Yield Strength.
11.    ASTM F3125, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, 120 ksi and 150 ksi Minimum Tensile Strength.
12.    AWS D1.1, Structural Welding Code.
13.    AISC, Manual of Steel Construction.
14.    AISC, Code of Standard Practice for Steel Buildings and Bridges.
15.    AISC, Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings and including the Commentary and Supplements thereto as issued.
16.    AISC, Specifications for Structural Joints using High Strength Bolts, approved by the Research Council on Structural Connections (RCSC).

17. SSPC Volume 2, Systems and Specifications, Surface preparation Guide and Paint Application Specifications.

### 1.03 QUALITY ASSURANCE

#### A. Design of Members and Connections:

1. All details shown are typical; similar details apply to similar conditions, unless otherwise shown or specified. Verify dimensions at the site without causing delay in the work.
2. CONTRACTOR shall examine conditions under which structural steel is to be provided and notify ENGINEER in writing of unsatisfactory conditions existing or whenever design of members and connections may not be clearly indicated. Do not proceed with the work until unsatisfactory conditions or deficiencies have been corrected in a manner acceptable to ENGINEER.

#### B. Source Quality Control:

1. Materials and fabrication procedures shall be subject to inspection and tests in the mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve the CONTRACTOR of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

#### C. Qualifications for Welding Work:

1. Qualify welding processes and welding operators in accordance with AWS "Structural Welding Code" D1.1, Section 5, Qualification.
2. Provide certification that all welders employed on or to be employed for the work have satisfactorily passed AWS qualification tests within the previous 12 months. CONTRACTOR shall ensure that all certifications are kept current.

#### D. Field Measurements:

1. Take field measurements prior to preparation of Shop Drawings and fabrication, where possible, to ensure proper fitting of the work. However, do not delay job progress; allow for trimming and fitting wherever taking field measurements before fabrication might delay the work.

#### E. Shop Assembly

1. Pre-assemble items in the shop to the greatest extent possible, so as to minimize field splicing and assembly of units at the project site. Disassemble units only to the extent necessary for shipping and handling limitations. Clearly mark units for reassemble and coordinated installation.

### 1.04 SUBMITTALS

#### A. Shop Drawings:

1. Submit for approval Shop Drawings including complete details and schedules for fabrication and shop assembly of members and details, schedules, procedures and diagrams showing the sequence of erection.
  - a. Include details of cuts, connections, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld.
  - b. Include details for field modifications and fabrications as required.

- c. Provide setting drawings, templates and directions for the installation of anchor bolts and other anchorages.
- 2. Submit for approval, copies of manufacturer's specifications and installation instructions for products listed below. Include laboratory test reports and other data as required to show compliance with these Specifications.
  - a. Structural steel of each type, including certified copies of mill reports covering the chemical and physical properties.
  - b. High-strength bolts of each type, including nuts and washers.
  - c. Unfinished bolts and nuts.
  - d. Touch-up field primer paint.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Rolled Steel Plates, Channels, Angles and Bars: ASTM A36, unless otherwise specified.
- B. Rolled Wide Flange Shapes: ASTM A992, unless otherwise specified.
- C. Circular HSS Members, ASTM A500, Grade C, 46 ksi yield stress, unless otherwise specified.
- D. Anchor Bolts: ASTM F1554, 36 ksi yield strength, nonheaded type unless otherwise specified.
- E. Anchor Nuts: ASTM A194 or ASTM A563, unless otherwise specified.
- F. High-Strength Threaded Fasteners: Heavy hexagonal structural bolts, heavy hexagon nuts, and hardened washers, as follows:
  - 1. Quenched and tempered medium-carbon steel bolts, nuts and washers, complying with ASTM F3125 grade A325; or
  - 2. Quenched and tempered alloy steel bolts, nuts and washers, complying with ASTM F3125 grade A490.
- G. Electrodes for Welding: E70XX complying with AWS D1.1, Design of New Buildings, Section 8.

### 2.02 FABRICATION

- A. Shop Fabrication and Assembly:
  - 1. General:
    - a. Fabricate and assemble structural assemblies in the shop to the greatest extent possible. Fabricate items of structural steel in accordance with AISC, Manual of Steel Construction, and as shown on the Shop Drawings.
    - b. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence, which will expedite erection and minimize field handling of materials.

- c. Where finishing is required, complete the assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in the final structure free of markings, burrs, and other defects.

B. Connections:

1. Shop Connections:

- a. Unless otherwise shown, shop connections may be welded or high strength bolted. Unless shown otherwise, all welds shall be 3/16-inch minimum.
- b. Shop welded connections shall be designed to eliminate or minimize eccentricity. The size, extent location and type of all shop welds shall be clearly shown on the Shop Drawings by use of AWS standard notations and symbols.
- c. End connection angles fastened to the webs of beams and girders and the thickness of the angles, size and extent of fasteners or shop welds shall conform to the AISC Manual. All connections shall be two sided unless otherwise shown.

2. Field Connections:

- a. All field connections, unless otherwise specified below or noted shall be made with high-strength bolts and shall be bearing type connections.
- b. Field welding is permitted only where noted or approved by the ENGINEER.

3. High-Strength Bolted Construction:

- a. Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using High Strength Bolts" (RCSC).
- b. High-strength bolt design shear values shall be as specified in the AISC Manual for bolts with threads in the shear plane.
- c. The minimum size of bolts shall be 3/4-inch diameter, unless otherwise noted.

4. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.

C. Holes and Appurtenances for other Work:

- 1. Provide holes required for securing other work to structural steel framing, and for the passage of other work through steel framing members, as shown on the Shop Drawings. If large block-outs are required and approved, the webs shall be reinforced to develop specified shears. Provide threaded nuts welded to framing and other specialty items as shown to receive other work.
- 2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.03 FINISH

A. Galvanizing

- 1. All structural steel members, shapes, plates, and hardware items, unless otherwise specified, shall be hot-dip galvanized as specified herein.

2. Surface Preparation:

- a. Prior to hot-dip galvanizing, all items shall be inspected in order to ensure that no un-vented, closed, or blind sections are included in any assembly, that all vent and drain holes are free of burrs and projecting roughness, and that all welding residues are completely removed.
- b. The standard method for cleaning items shall be by pickling in a dilute hot sulfuric acid solution. After pickling, surfaces shall be thoroughly rinsed with clean water. If an item cannot be properly cleaned by pickling, or when directed by the ENGINEER, all surfaces of said item shall be blast cleaned to a "near white" condition as described in SSPC standards.

3. Coating:

- a. The application of zinc coating shall conform to the following requirements:
  - 1) ASTM A123 for Structural Shapes, Plates, Bars, and Fabricated Assemblies.
  - 2) ASTM A153 for Hardware and Threaded Components
- b. The average weight and thickness of the zinc coating shall be as listed below:

<u>Specification and Product Form</u>	<u>Avg. Wt. Oz./Ft.<sup>2</sup></u>	<u>Avg. Thk. mils.</u>
ASTM A123 Structural Shapes, Plates, Bars, and Fabricated Assemblies:		
1/8" and 3/16" Thick Steel	2.0	3.4
1/4" and Thicker	2.3	3.9
ASTM A153 Hardware:		
Castings	2.0	3.4
Rolled, pressed, and forged:		
Thickness $\geq 3/16"$ , length $> 8"$	2.0	3.4
Thickness $\leq 3/16"$ , length $> 8"$	1.5	2.6
Any thickness, length $< 8"$	1.3	2.2
Bolts and Drive Screws (over 3/8" dia. and under) and similar articles	1.2	2.1
Screws, stove bolts, and bolts (over 3/8" dia. and under) and similar articles	1.0	1.7

- c. Structural sections and their major components warped during the galvanizing process shall be straightened to AISC tolerances. Warped plate shall be pressed flat.
- d. All threaded openings shall be re-tapped after galvanizing. Male threads shall not be re-cut.
- e. Galvanized surfaces damaged subsequent to cleaning shall be repaired in accordance with SSPC specifications. Repair with AMCO 32 galvanizing stick or AMCO 3017 galvanizing coating repair bar as manufactured by Force Industries Division or approved equal.

## 2.04 SOURCE QUALITY CONTROL AND TESTING

- A. Provide shop testing and analysis of structural steel sections.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examination of existing conditions shall be performed in accordance with the Special Conditions of these specifications.

### 3.02 ERECTION

- A. General: Comply with the AISC Specifications and Code of Standard Practice, and as specified herein.
- B. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of the structures as erection proceeds.
- C. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean the bottom surface of base and bearing plates.
  - 1. Set loose and attached base plates and bearing plates for structural members on steel wedges or other adjusting devices.
  - 2. Tighten the anchor bolts after the supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the base or bearing plate prior to packing with grout.
  - 3. Place grout between bearing surfaces and base or plates as required. Finish exposed surfaces, protect installed materials, and allow to cure in strict compliance with the manufacturer's instructions, or as otherwise required.
  - 4. Leveling plates and wood wedges will not be permitted.
- D. Field Assembly: Set structural frames accurately to the lines and elevations indicated. Align and adjust the various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces, which will be in permanent contact before assembly. Perform necessary adjustment to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of the structure within tolerances as specified in AISC Manual. For members requiring accurate alignment, clip angles, lintels and other members shall be provided with slotted holes for horizontal adjustment at least 3/8-inch in each direction, or more when required.
  - 2. Splice members only where shown or specified.
- E. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces.

F. Comply with AISC Manual for bearing, adequacy of temporary connections, alignment, and the removal of paint on surfaces adjacent to field welds.

1. Do not enlarge unfair holes in members by burning or by the use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

G. Fastening to in-place construction:

1. Provide anchorage devices and fasteners where necessary for securing structural steel and miscellaneous metal items to in-place construction; including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts and other connectors as required.

H. Gas Cutting: Do not use gas-cutting torches in the field for correcting fabrication errors in the structural framing. Cutting will be permitted only on secondary members, which are not under stress, as acceptable to the ENGINEER. Finish gas-cut sections equal to a sheared appearance when permitted.

### 3.03 FIELD QUALITY CONTROL

A. Correct deficiencies in structural steel work, which inspection and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at CONTRACTOR's expense, as may be necessary to reconfirm any non-compliance of the original work, and as may be necessary to show compliance of corrected work.

END OF SECTION



## SECTION 05500

### MISCELLANEOUS FABRICATIONS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Shop-fabricated ferrous and non-ferrous metal and fiberglass items, including miscellaneous framing, custom fabrications, bollards, ladders, access hatches, wall brackets, custom pipe supports, etc.

##### 1.02 RELATED SECTIONS

- A. Section 05520 - ALUMINUM RAILINGS.
- B. Section 05531 - GRATING.
- C. Section 09900 - PAINTING.
- D. Section 15150 - SUPPORTS AND ANCHORS.
- E. Section 16191 - ELECTRICAL SUPPORTS, ANCHORS AND FASTENERS.

##### 1.03 REFERENCES

ANSI A14.3	Ladders, Fixed, Safety Requirements
ASTM A36	Structural Steel shapes (36 ksi)
ASTM A53	Pipe, Steel, Black and Hot-Dip Galvanized
ASTM A123	Zinc Coating (Hot-Dip Galvanized) on Steel Products
ASTM A153	Zinc Coating (Hot-Dip Galvanized) on Steel Hardware
ASTM A276	Stainless and Heat-Resisting Steel Bars and Shapes
ASTM A307	Carbon Steel Bolts and Studs, 60 ksi Tensile Strength
ASTM A489	Carbon Steel Eyebolts
ASTM A500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A992	Structural Steel Shapes (50 ksi)
ASTM B209	Aluminum-Alloy Sheet and Plate
ASTM B221	Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
ASTM B308	Aluminum-Alloy 6061-T6 Standard Structural Shapes
ASTM B632	Aluminum Tread Plate
ASTM F1554	Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, 120 ksi and 150 ksi Minimum Tensile Strength
ASTM F593	Stainless Steel Bolts, Hex Cap Screws, and Studs
AWS A2.0	Standard Welding Symbols
AWS D1.1	Welding Code - Steel
AWS D1.2	Welding Code - Aluminum
SSPC	Steel Structures Painting Council

#### 1.04 SUBMITTALS

- A. Shop Drawings
  - 1. Include detailed fabrication drawings, erection drawings, bill of materials, finishes, and applicable details such that the CONTRACTOR does not need to reference the Contract Drawings.
  - 2. Indicate profiles, sizes, connections, attachments, reinforcing, anchorage, size and type of welds, holes, fasteners, and accessories.
  - 3. All resubmittals of shop drawings shall have all revisions/corrections clearly highlighted to the ENGINEER (e.g., labeled, clouded, etc.).
- B. Submit manufacturer's product data for floor hatches, ladders, and other manufactured items to include details of manufactured product with installation instructions.

#### 1.05 QUALIFICATIONS

- A. Weld procedures and welder personnel shall be AWS qualified. Keep procedures and certifications on file. Submit only when requested.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Steel Channels, Angles, and Plates - ASTM A36.
- B. "W"-Shape Steel Beams - ASTM A992, Grade 50.
- C. "S"-Shape Steel Beams - ASTM A36.
- D. Rectangular and Square Hollow Structural Sections (HSS) - ASTM A500, Grade B.
- E. Aluminum Sections - ASTM B308 Alloy 6061-T6. Use Aluminum Association shapes.
- F. Stainless Steel Structural Shapes - ASTM A276, Type 316 or Type 316/316L, annealed.
- G. Stainless Steel Angles and Plates - ASTM A276, Type 316 or Type 316/316L.
- H. Aluminum Checkered Floor Plate - ASTM B632 Alloy 6061-T6.
- I. Pipe - Schedule 80; steel ASTM A53 Grade B; aluminum alloy 6063-T6.
- J. Bolts - F593 stainless steel, Type 316 with raised letter of symbol indicating manufacturer; ASTM F3125 Grade A325 carbon steel; galvanized bolts galvanized to ASTM A153; ASTM A489 steel eyebolts.  
  
All bolt accessories including nuts, washers, etc. shall be of the same material as the bolts.
- K. Bolted Attachment to Existing Concrete and Masonry – For structural loads, use chemical adhesive anchors as specified on drawings Expansion anchors are not allowed unless specifically requested by CONTRACTOR for a particular application and approved by ENGINEER.
- L. Anchor Rods (Bolts) – ASTM F1554 Grade 36.
- M. Welding Materials - AWS D1.1 and D1.2; type required for materials being welded.
- N. Touch-Up Primer for Galvanized Surfaces - Zinc-rich paint.

- O. Bollards - 6-inch steel pipe; concrete filled, crowned cap; prime and finish paint.
- P. Anchorage for metal items cast in concrete shall have welded-on strap anchors 2 feet o.c., made from 1/4-inch thick x 1-inch wide x 6-inch long bar stock with each end bent 90 degrees.
- Q. Floor Access Hatches
  - 1. Hatch shall be H230 load rated and consist of 1/4-inch aluminum checkered plate cover with watertight gasket seal, aluminum channel frame with drain coupling, backpainted, complete stainless steel hardware including standard slam lock with security cover plug. Use standard size single- or double-leaf Bilco Type J-AL H20 or JD-AL H20, EJ Group Type DT-HD-AOSG or DTD-HD-AOSG, Halliday Products Series H1W or H2W, or equal.
  - 2. Provide a hinged aluminum or FRP safety grate fall-through protection system at all floor hatches. The safety grate shall not reduce the clear opening of the specified hatch size.
- R. Aluminum Ladders
  - 1. Ladders to conform in all respects to the requirements of OSHA 1910.27.
  - 2. See Drawings for specific configurations.
  - 3. 6061-T6 or 6063-T5 mill finish aluminum.
  - 4. Bolts to be Type 316 stainless steel, minimum 5/8-inch diameter.
  - 5. All welds and sharp edges to be ground smooth.
  - 6. Side rails shall be 1/8-inch minimum thickness rectangular tube or channel in profile and to have minimum dimensions of 1-1/16 inches wide by 2-1/2 inches deep.
  - 7. Rungs
    - a. Square or rectangular in profile with ridged or serrated non-slip top surface, capable of supporting a 300-lb. concentrated load at any point along the length of the rung without failure or permanent deformation.
    - b. Vertical spacing of rungs to be equal, from floor to upper landing, and not to exceed 12 inches.
    - c. Centerline of rungs to be 7 inches from wall or other surface or obstruction opposite climber.
    - d. Material to match side rails.
  - 8. Provide stainless steel or aluminum telescoping safety post at all ladders below hatches. Provide "Ladder UP" by Bilco, "Safety Post" or "Safety Extensions" by U.S.F. Fabrication, or equal.

## 2.02 FINISHES

- A. Prepare steel surfaces in accordance with SSPC SP-6.
- B. Do not prime surfaces where field welding is required.
- C. Galvanize in accordance with ASTM A123 or A153. Provide minimum 2.0 oz/sq. ft. galvanized coating.
- D. Shop prime paint steel items, not galvanized, and top coat after installation.
- E. Unless noted otherwise, aluminum shall be mill finish.
- F. Aluminum in contact with concrete or masonry shall be backpainted with bituminous paint.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Ensure that field conditions are acceptable and are ready to receive work. Measurements and dimensions to be field verified.

- B. Beginning of installation means CONTRACTOR accepts existing conditions.

### 3.02 FABRICATION

- A. Fit and shop assemble in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Welds shall be continuous unless noted otherwise.
- D. Exposed Mechanical Fastenings - Unobtrusively located, consistent with design of component.
- E. Supply components required for anchorage of fabrications. Aluminum fabrications require stainless steel fasteners.

### 3.03 FABRICATION TOLERANCES

- A. Squareness - 1/8-inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces - 1/16-inch.
- C. Maximum Misalignment of Adjacent Members - 1/16-inch.
- D. Maximum Bow - 1/8-inch in 48 inches.
- E. Maximum Deviation From Plane - 1/16-inch in 48 inches.

### 3.04 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Perform field welding in accordance with AWS.
- D. Fasten aluminum fabrications using Type 316 stainless steel bolts.
- E. Carbon steel bolts shall only be used for carbon steel framing connections.
- F. Isolate dissimilar metals with dielectric and appropriate fasteners.
- G. Obtain ENGINEER approval prior to site cutting or making adjustments not indicated.
- H. Prior to installation, aluminum surfaces in contact with concrete and/or masonry require backpainting.
- I. After erection, touch up paint welds, bolts, connection material, and abrasions.
- J. Top paint all exposed steel that is not galvanized.
- K. Fiberglass Fabrications - All field cuts and drilled holes shall be sealed with vinyl ester resin as supplied by the manufacturer to provide maximum corrosion protection.

3.05      INSTALLATION TOLERANCES

- A.    Maximum Variation From Plumb - 1/4-inch.
- B.    Maximum Offset From True Alignment - 1/4-inch.
- C.    Maximum Out-of-Position - 1/4-inch.

END OF SECTION

## SECTION 05510

### STAIRS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Framing for aluminum stair] use structural sections.
- B. Treads for aluminum stairs are open grate as indicated.
- C. Risers are closed using aluminum plate.
- D. Landings as part of the stair system use open grating material to match tread design.

##### 1.02 RELATED SECTIONS

- A. Section 03300 – CONCRETE.
- B. Section 05500 – MISCELLANEOUS FABRICATIONS.
- C. Section 05520 – ALUMNINUM RAILING SYSTEMS.
- D. Section 05531 – GRATING.
- E. Section 09900 – PAINTING.

##### 1.03 REFERENCES

- A. See Section 05500.

##### 1.04 DESIGN REQUIREMENTS

- A. Fabricate stairs and landings to support a live load of 100 lb/sq.ft. and a concentrated load of 300 lbs, with deflection of stringers or landing framing not to exceed 1/240 of span. Deflection of treads not to exceed 1/4 inch.
- B. Fabricate handrails per Section 05520.

##### 1.05 SUBMITTALS

- A. Shop Drawings - Include complete fabrication details and erection plans, including connections, attachments, reinforcing, anchorage, size and type of fasteners, accessories, and all dimensions. Photocopies of Contract Drawings, in whole or in part, are not acceptable.
- B. Indicate welded connections using standard AWS welding symbols.
- C. Submit product data for manufactured items, with items of intended use, highlighted or otherwise indicated.

##### 1.06 FIELD MEASUREMENTS

- A. Field verify all measurements before fabrication.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Reference Section 05500.
- B. Interior aluminum stair treads are extruded aluminum 6061-T6, specialty manufactured, non-slip stair tread design with built-in nosing, 1-1/2-inch minimum depth by 12 inches wide with end caps for attachment to stringers. By "Diamondback" or equal.
- C. Wooster Products, Inc. - Product: Stair nosing, Alumogrit, Type 101.
- D. Safe-T-Metal - Product: Stair nosing, Type AX.
- E. For grating treads, reference Section 05531.
- F. Fasteners for aluminum fabrications shall be Type 316 stainless steel.

### 2.02 FABRICATION - GENERAL

- A. Reference Section 05500.
- B. Fit and shop assemble in largest practical sections, for delivery to site.
- C. Fabricate components with joints tightly fitted and secured.
- D. Seal jointed pieces by continuous welds.
- E. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- F. Supply components required for anchorage of fabrications. Use stainless steel connectors on aluminum.
- G. Clean, straight, sharply-defined profiles with smooth surfaces of uniform color, free from defects. Welding on unexposed side in order to prevent pitting or discoloration. Finish to be free from scratches, "leave-off marks," or other surface blemishes.
- H. Provide all hangers, framing clips, anchors, etc., required for complete installation.

### 2.03 FABRICATION – ALUMINUM OPEN GRATING STAIRS AND LANDINGS

- A. Refer to Section 05531 for treads, grating, and abrasive nosing at landings.
- B. Fabricate stringers using aluminum channels.
- C. Fabricate treads and landings using minimum 1-1/2-inch deep grating as indicated. Support with angles or channels to meet design load requirements.

### 2.04 FINISHES

- A. Backpaint aluminum surfaces in contact with concrete and masonry with bituminous paint.
- B. Aluminum surfaces to be mill finish.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means Contractor accepts existing conditions.

### 3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required. Prime following field welding.

### 3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
- C. All bolts shall be stainless steel and anchors to concrete or masonry shall be stainless steel, adhesive type or ASTM F1554, galvanized type cast into concrete per drawings.
- D. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- E. Field weld components indicated on shop drawings. Perform field welding in accordance with AWS.
- F. Field bolt and weld to match shop bolting and welding. Conceal bolts and screws whenever possible.
- G. Mechanically fasten joints butted tight. Grind welds smooth and flush.
- H. Obtain Engineer approval prior to site cutting or making adjustments not indicated.
- I. Exposed work shall be neatly finished. Joints shall be made true and tight. Where possible, weld rather than bolt. Bolt threads shall not project beyond nuts more than one thread or shall be cut off and ground smooth.
- J. Nuts susceptible to loosening after erection shall have the thread upset to prevent nut from loosening.

### 3.04 INSTALLATION TOLERANCES

- A. Maximum Variation from Plumb - 1/4-inch.
- B. Maximum Offset from True Alignment - 1/4-inch.

END OF SECTION



## SECTION 05520

### ALUMINUM RAILINGS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Aluminum guardrails and handrails (both referred to as railing).
- B. Railing to be assembled using non-welded components with internal splice insert system that produces a consistent outside diameter of fittings and railing.

##### 1.02 RELATED SECTIONS

- A. Section 05500 - MISCELLANEOUS FABRICATIONS.
- C. Section 05510 - ALUMINUM STAIRS.
- D. Section 09900 - PAINTING.

##### 1.03 REFERENCES

AAMA	American Architectural Manufacturers Association
ASTM A53	Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe
ASTM A386	Zinc-Coating (Hot-Dip) on Assembled Steel Products
ASTM A500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes
ASTM B221	Aluminum-Alloy 6063 Extruded Bars, Rods, Wire, Shapes, and Tubes
ASTM B241	Aluminum-Alloy 6063 Seamless Pipe and Extruded Tube

##### 1.04 DESIGN REQUIREMENTS

- A. Railing assembly and attachments to resist the maximum force from a concentrated lateral load of 200 lbs. or a uniform load of 50 lbs. per linear foot at any point or direction without damage or permanent set. Vertical posts must withstand concentrated load applied at the top of 200 lbs. with a 4 foot 0 inch maximum post spacing.

##### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect from corrosion, deformation and other types of damage. Store items in an enclosed area free from contact with soil and weather. Replace damaged items with new materials.

##### 1.06 SUBMITTALS

- A. Shop Drawings - Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, accessories, materials, and finishes.
- B. Provide detailed shop fabrication and erection drawings to include connections, fittings, complete bill of materials, finishes, etc.
- C. Product Data - Provide single-page catalog cut sheets on base mounts, side mounts, and all manufactured items.

1.07 FIELD MEASUREMENTS

- A. Field verify all dimensions before fabrication.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Julius Blum and Company - Connectorail system with #7571 floor flange or #757/758 fascia flange (aluminum).
- B. Moultrie Mfg. Company - Wesrail II system with #W32612 base or #WIISMBEXT side-mount bracket (aluminum).
- C. Tubular Specialties Mfr., Inc. - Adaptarail system with #662 floor flange (aluminum).
- D. Or equal. (Substitutes are allowed provided that the submitted manufacturer can demonstrate satisfaction of load requirements as stated above.)

2.02 ALUMINUM RAILING SYSTEM

- A. Rails - 1-1/2-inch diameter, extruded aluminum Schedule 80 pipe per ASTM B241.
- B. Posts - 1-1/2-inch diameter, extruded aluminum Schedule 80 per ASTM B241.
- C. Fittings - Elbows, T-shapes, etc.; machined aluminum.
- D. Welded components require aluminum filler Alloy 5356 to improve color match after anodizing treatment.
- E. Mounting - Pre-manufactured, heavy duty, four-bolt floor flange with internal reinforcement post or side-mount fixture.
- F. Splice Connectors - Concealed spigot machined aluminum.
- G. Exposed Fasteners - Flush countersunk stainless steel screws or bolts; consistent with design of railing.
- H. Vertical posts to be spaced at 4 feet 0 inches o.c. maximum.
- I. Toeboards shall be manufacturer's standard, OSHA compliant.

2.03 FABRICATION

- A. Fabricate aluminum railing with compatible connectors, fittings and fasteners. Joints to be mechanical without welding. Provide floor mounts and/or side mounts, terminals, flanges, and caps, etc., as indicated and required for complete installation. Railing details to be as indicated on Contract Drawings.
- B. Fit and shop assemble components in largest practical sizes, for delivery to site.
- C. Fabricate components with joints tightly fitted and secured.
- D. Supply components required for anchorage of fabrications. Fabricate related components of same material and finish as fabrication.
- E. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

- F. Accurately form components to suit stairs, landings, and building structure. Terminate stair handrails as indicated on Contract Drawings.
- G. All railings shall be protected from entrapped water and from temperature-induced stresses. The railing manufacturer shall provide weep holes and expansion joints.
- H. Toeboards shall be provided at all railings where the platform framing does not extend a minimum of 4 inches above the walking (grating) surface. Toeboards shall be fastened at each post.

## 2.04 FINISHES

- A. Aluminum railing systems shall receive a clear anodized finish meeting AAMA, Class I.
- B. Aluminum toeboards shall be mill finish.
- C. Backpaint aluminum surfaces in contact with concrete or masonry with bituminous paint.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.

### 3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects.
- C. Provide and install anchors, plates or angles required for connecting railings to structure.
- D. Make connections using stainless steel fasteners and isolate with dielectric.
- E. Conceal bolts and screws whenever possible.

### 3.03 INSTALLATION TOLERANCES

- A. Maximum Variation From Plumb - 1/4-inch.
- B. Maximum Offset From True Alignment - 1/4-inch.

END OF SECTION

## SECTION 05531

### GRATING

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Aluminum floor grating.
- B. Aluminum stair treads.
- C. Perimeter frames and supports.

##### 1.02 RELATED SECTIONS

- A. Section 0330 - CONCRETE.
- B. Section 05500 - MISCELLANEOUS FABRICATIONS.

##### 1.03 REFERENCES

AWS A2.4	Standard Symbols for Welding
AWS D1.1	Welding Code - Steel
AWS D1.2	Welding Code - Aluminum
NAAMM MBG 531	Metal Bar Grating Manual
NAAMM MBG 533	Welding Specifications for Fabrication of Steel, Aluminum, and Stainless Steel Bar Grating
ASTM B221	Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
ASTM B308	Aluminum Alloy 6061-T6 Standard Structural Shapes
ASTM B632	Aluminum Tread Plate

##### 1.04 PERFORMANCE REQUIREMENTS

- A. Loading Requirements
  - 1. At Platforms and Walkways - Uniform live load of 60 lbs/sq .ft. and a concentrated load of 300 lbs.
  - 2. At Stairs and Stair Landings - Uniform live load of 100 lb/sq. ft. and a concentrated load of 300 lbs.
- B. Maximum Allowable Deflection Under Live Load
  - 1. Aluminum Grating and Extruded Planks - 1/240 of span.
- C. Clear space between grating bearing bars shall be 1 inch or less.

##### 1.05 SUBMITTALS

- A. Shop Drawings - Indicate details of gratings, stair treads,, component supports, fasteners, openings, perimeter construction details, and tolerances.

- B. Provide detailed fabrication and erection drawings showing panel layouts with all panel sizes and weights.
- C. Provide catalog cut of selected grating details along with manufacturer's span and deflection tables.
- D. Provide a fabricated sample for aluminum grating shall be as follows:
  - 1. Aluminum Grating Sample - 6-inch square to illustrate style, surface finish, welding, edge banding, and workmanship.
  - 2. Edge Support Frame - 6-inch by 6-inch corner section to show workmanship, anchors, welding, and finish. Attach grating sample to frame sample with proposed grating anchor.

#### 1.06 QUALIFICATIONS

- A. Weld procedures and welder personnel must be AWS qualified. Maintain procedures and certificates on file.

#### 1.07 COORDINATION

- A. Field verify all dimensions prior to fabrication.
- B. Coordinate embedment of frames with concrete placement.
- C. Coordinate placement of panels with platform framing.
- D. Coordinate placement of frames and panels with required openings and penetrations for piping and conduit, instrumentation controls, mechanical equipment, etc.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Aluminum Grating
  - 1. IKG Industries - Product: Aluminum rectangular bar, Type BS with serrated surface. IKG Industries extruded frame.
  - 2. Ohio Gratings, Inc. - Product: Aluminum rectangular bar Type 19-SG-4 with serrated surface. Ohio Gratings extruded angle frame.
  - 3. Or equal.

#### 2.02 MATERIALS

- A. Aluminum Grating, Stair Treads, Frames, Support Angles, and Banding - ASTM B221 alloy 6061-T6 or 6063-T6; mill finish.

#### 2.03 DISSIMILAR MATERIALS

- A. Where dissimilar metals contact, provide approved dielectric of laminated plastic.
- B. Backpaint aluminum support frames and angles in contact with concrete or masonry using a bituminous paint.

#### 2.04 ACCESSORIES

- A. Fasteners - All fasteners, including hold-down clips, handles, etc. to be Type 316 stainless steel for aluminum grating.

- B. Stair treads to have abrasive nosings.

## 2.05 FABRICATION

- A. Aluminum grating panels (80 pounds maximum weight per panel) shall have continuous edge banding along the cut ends of the bearing bars. The cross bars shall be cut back flush to face of bearing bars and ground smooth to remove sharp edges.
- B. Edge banding shall be installed flush with top and bottom of grating/panel and surrounding construction. In exception to NAAMM MBG 533 (2.1 Welding Standards), welds to be within center 75 percent of depth of bearing bar, not extending to top or bottom edge of grating.
- C. Grating requires fabricated frames fastened to anchor rods embedded into concrete unless indicated otherwise on the Contract Drawings. When anchorage embedment into concrete is not possible, support angles shall be attached to the concrete walls with Type 316 stainless steel adhesive anchors as indicated on the drawings.
  - 1. Aluminum Frames - Shop fabricated, miter cut and welded corners. Frames to be four-sided fabrications where practical, of 1/4-inch thick aluminum sections, as indicated. Welds to be ground smooth.
- D. For all grated areas, the grating shall be cut such that all non-bearing cross bars are in alignment when viewed perpendicular to the span of the grating.
- E. Grating shall be fabricated in panels that can be easily removed. Provide smaller panels where special access to equipment is required.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Ensure that opening sizes and dimensional tolerances are acceptable.
- B. Ensure that supports, anchors, edge bands and frames are correctly positioned.

### 3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions.
- B. Place frames in correct position, plumb and level.
- C. Mechanically cut aluminum components.
- D. All grating bearing bars shall be banded and completely supported and not allowed to deflect by hanging off cross bars.
- E. Anchor non-removable grating panels by bolting through Type 316 stainless steel or galvanized saddle clips at four corners to prevent movement or rocking. Wedges or shimming devices will not be permitted.
- F. Items to be installed in conformance with specifications and details shown on approved shop drawings with all parts in alignment, true and rigid.

- G. Brackets, supports, and other details not shown on the Contract Drawings, but necessary for the work, shall be furnished by the CONTRACTOR. To this extent, at all areas where the CONTRACTOR modifies existing grating or installs new grating or checkered plate, the CONTRACTOR shall include all required labor and materials to provide additional miscellaneous supports, anchors, and banding as required for a complete installation as determined by ENGINEER.
- H. Install removable sections over all stop plates and where indicated on the Contract Drawings.
- I. Install grating around piping, conduits, and other openings and penetrations and up to all sluice gate and slide gate guides.
- J. Completed installation shall not leave gaps larger than 1 inch around perimeter of penetrations and more than 2 inches in front of gates.

### 3.03 INSTALLATION TOLERANCES

- A. Conform to NAAMM MBG 531 and FGM-2003 where applicable and as indicated below.
  - 1. Maximum Space Between Adjacent Sections - 1/8-inch.
  - 2. Maximum Variation From Top Surface Plane of Adjacent Sections -  $\pm 1/8$ -inch.

END OF SECTION

## SECTION 09900

### PAINTING

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Surface preparation, field and shop application of paints and coatings.
- B. Color coding and labeling of pipe and conduits.
- C. Coordination of shop and field painting.

##### 1.02 RELATED SECTIONS.

- A. Section 03300 - CONCRETE.
- B. Section 05500 - MISCELLANEOUS FABRICATIONS.
- C. Section 15060 - INSIDE PROCESS PIPING.
- D. Section 15100 - VALVES AND APPURTENANCES.
- E. Section 15120 - PIPING SPECIALTIES AND ACCESSORIES.
- F. Section 15150 - SUPPORTS AND ANCHORS.

##### 1.03 REFERENCES

ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM D522	Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings (Method A, Conical Mandrel)
ASTM D870	Standard Practice for Testing Water Resistance of Coatings Using Water Immersion
ASTM D1014	Standard Practice for Conducting Exterior Exposure Tests of Paints and Coatings on Metal Substrates
ASTM D1653	Moisture Vapor Transmission
ASTM D2794	Impact
ASTM D3363	Hardness
ASTM D4541	Adhesion (Type II Fixed Alignment Adhesion Tester)
ASTM D4541	Adhesion (Type V Self-Aligning Adhesion Tester)
ASTM D4585	Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation
ASTM D16	Standard Terminology for Paint-Related Coatings, Materials, and Applications
ASTM D4060	Abrasion Resistance (CS-17 Wheel, 1000 Grams Load)
ASTM D3359	Adhesion by Tape Test
ASTM G53	QUV Exposure (UVA-340 Bulbs, 4 Hours Light, 4 Hours Dark)
ASTM G85	Prohesion



NACE	NACE International (formerly “National Association of Corrosion ENGINEERS”) – Certification Program
NSF International	ANSI/NSF Standard 61
SSPC-Volumes I and II	Steel Structures Painting Council - Steel Structures Painting Manual
SSPC-SP1	Solvent Cleaning
SSPC-SP2	Hand Tool Cleaning
SSPC-SP3	Power Tool Cleaning
SSPC-SP5	White Metal Blast Cleaning
SSPC-SP6	Commercial Blast Cleaning
SSPC-SP7	Brush-Off Blast Cleaning
SSPC-SP10	Near-White Metal Blast Cleaning
SSPC-SP11	Power Tool Cleaning to Bare Metal
N.S.F. (National Sanitation Foundation)	

#### 1.04 DEFINITIONS

- A. Conform to ASTM D16 for interpretation of terms used in this section.

#### 1.05 SUBMITTALS

- A. Unless the CONTRACTOR has a successful experience record of painting on projects of similar size and nature, all field painting shall be by an approved painting subcontractor. Submit painting experience record of proposed subcontractor/ CONTRACTOR for approval.
- B. Submit a complete schedule of paint systems and surface preparations proposed.
1. List all interior and exterior surfaces and all major equipment to be painted.
  2. The schedule is to reflect the approved manufacturer’s recommendations. Schedule shall include certification that a qualified manufacturer’s representative has reviewed and approved the schedule. The qualified manufacturer’s representative shall hold current NACE certification as a Coating Inspector, Protective Coatings Specialist, or Materials Selection/Design Specialist.
  3. As a minimum, schedule shall itemize each painted item or surface and shall contain the following information in tabular format:
    - a. Type of surface preparation (note whether shop or field preparation).
    - b. Paint system (generic name).
    - c. Prime coat (product, number of coats, dry mil thickness per coat, square feet coverage per gallon).
    - d. Intermediate coat, if required (product, number of coats, dry mil thickness per coat, square feet coverage per gallon).
    - e. Finish coat (product, number of coats, color, dry mil thickness per coat, square feet coverage per gallon).
    - f. Painting status at time of installation.
    - g. Remarks (any special treatment or application requirements, etc.).
  4. The schedule shall follow the sample format attached to the end of this section. It shall also contain the name of the paint manufacturer and name, address, and telephone number of the manufacturer’s representative who will inspect the work. The schedule shall be in conformance with the criteria of Tables A-1, A-2, and A-3 and the schedules contained in the architectural drawings. Manufacturer’s recommended dry mil thickness shall be incorporated into the schedule. Schedule shall be submitted to the ENGINEER as soon as possible following the award of contract so that the approved schedule may be used to identify colors and to specify shop paint systems for fabricated equipment.

5. An Equipment Finish Schedule is provided as Table A-2. The requirements of Equipment Finish Schedule shall govern if they exceed the requirements of Table A-1 or of these specifications. The Equipment Finish Schedule is provided only as a guide for the CONTRACTOR. There may be additional items and surfaces, which require painting in accordance with these specifications.
- C. Submit color chips for selection. Color names and/or numbers shall be identified according to the appropriate color chart published by the manufacturer.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Paint and paint products shall be as designated for the following uses and as manufactured by the following manufacturers or approved equal:
1. Tnemec Company, Inc.
  2. The Carboline Company, part of the StonCor Group, an RMP Company (TCC).
  3. PPG Industries.
- B. Equivalent materials of other manufacturers may be substituted only by approval of ENGINEER.
1. Requests for substitution shall include manufacturer's literature for each product giving the name, generic type, descriptive information, solids by volume, recommended dry film thicknesses.
  2. Requests for substitution shall also include a list of five projects where each product has been used and rendered satisfactory service; which list shall include the following information:
    - a. Name and location of the plant.
    - b. A contact (name and telephone number) at the plant who is in a position to be aware of the performance of the proposed coatings; typically, the plant superintendent, chief operator, or maintenance director.
    - c. Information about which coatings were used on which surfaces at the referenced plant.
  3. No request for substitution shall be considered that would decrease film thickness or offer a change in the generic type of coating specified. Manufacturer's certified test reports showing that substitute product(s) equal or exceed performance of specified products as tested according to:
    - a. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
    - b. ASTM D522 - Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings (Method A, Conical Mandrel).
    - c. ASTM D870 - Standard Practice for Testing Water Resistance of Coatings Using Water Immersion.
    - d. ASTM D1014 - Standard Practice for Conducting Exterior Exposure Tests of Paints and Coatings on Metal Substrates.
- C. Products for each specified function and system shall be of a single manufacturer.
- D. Where thinning is necessary, only the products of the particular manufacturer furnishing the paint shall be used and all such thinning shall be done in strict accordance with the manufacturer's instructions.
- E. Pipe and conduit labels as manufactured by Seton Nameplate Corporation or EMED Company, Inc.

## 2.02 MATERIALS

- A. Paint - Refer to Table A-1, Coating System Schedule.
- B. All materials, which will be in contact with potable water, shall be approved by the National Sanitation Foundation (NSF) Standard 61 and appropriate state and local health departments. CONTRACTOR shall submit evidence of approval for all applicable materials.
- C. All materials used on this project, whether shop applied by equipment manufacturer or field applied by CONTRACTOR, shall comply with all current federal, state and local Clean Air Act-related regulations. It shall be the responsibility of equipment manufacturers to comply with laws in effect at their painting facilities. Where laws or regulations prohibit field applications of any scheduled paint product, CONTRACTOR shall submit for ENGINEER's approval, an alternate product of similar performance characteristics which complies with those laws. If approved, those products shall be provided at no additional cost to the OWNER.
- D. Pipe and Conduit Labels
  - 1. Shall be removable semi-rigid plastic (not pressure-sensitive) identification markers meeting all applicable ANSI and OSHA standards.
  - 2. CONTRACTOR is advised that, due to nature of this project, labels may require custom fabrication.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Ensure that substrate conditions are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Correct any condition that may potentially affect proper application.

### 3.02 SURFACE PREPARATION

- A. All surfaces to be painted shall be prepared with the objective of obtaining a clean and dry surface free from dust, rust, scale and all foreign matter. No painting shall be done before surfaces meet requirements of paint manufacturer.
- B. Hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place prior to cleaning and painting, and not intended to be painted, shall be protected or removed during painting operations and repositioned upon completion of painting operations.
- C. All surface preparations shall be in strict accordance with the recommendations of the paint manufacturer.
- D. Ferrous Metals
  - 1. All ferrous metal to be primed shall have all rust, dust, and scale removed by abrasive blast cleaning in accordance with SSPC (Steel Structures Painting Council) procedures designated in the Specifications or on Contract Drawings. Cleaned metal shall be primed or pretreated immediately after cleaning to prevent rusting. If rusting beyond ASTM Rust Grade 8 occurs in the field, rusted portions of shop-primed ferrous metals shall be field-cleaned in accordance with SSPC blast cleaning specification appropriate for service and immediately field primed.
  - 2. All ferrous metals not primed in shop shall be abrasive blast cleaned to SSPC-SP10 Near White Blast or an SSPC-SP6 Commercial Blast, depending on exposure, prior to application of any primer, pretreatment, or paint.

- E. Nonferrous Metals - All nonferrous metals, whether shop or field primed, shall be solvent cleaned (SSPC-SP1) prior to application of primer.
- F. Concrete - All concrete surfaces shall be cleaned of all dust, form oil, curing compounds, and other foreign matter before paints or coating are applied. Poured concrete and submerged surfaces to be painted shall be prepared using the following method:
  - 1. Blasting - Brush-off abrasive blast-cleaning of concrete shall be described as lightly abrading the surface without entirely removing surface or exposing underlying aggregate. Brush-off abrasive blasting shall open up subsurface holes and voids and etch the surface sufficiently for coatings to bond and adhere satisfactorily. Care shall be taken during blasting that concrete is not eroded unnecessarily.
    - a. Dry abrasive blasting equipment with a compressed air blast nozzle shall be used for blasting concrete. After blast cleaning is completed, abrasive dust and loose particles shall be removed from surface by vacuuming and blowing off with high-pressure air. Voids and cracks that will cause discontinuities in coatings or unsightly appearance shall be patched in accordance with Section 03001.
    - b. All floor and tank drains subject to abrasive spray shall be plugged prior to blasting. After blasting is completed, all abrasive shall be removed from area prior to opening drains. Under no circumstances shall abrasive be allowed to enter tank or floor drains.
- G. Wood - Wood surfaces shall be thoroughly cleaned and free of all foreign matter, with cracks, nail holes and other defects properly filled and smoothed. Wood trim shall be sandpapered lightly when dry, before a second coat of paint or stain is applied. All wood trim shall be primed and backprimed before being set in place; all end grain and cut wood shall be thoroughly saturated with sealer before priming. After the prime coat on woodwork has dried, all nail holes, cracks, open joints, and other small holes shall be filled neatly with approved spackling putty. Exposed nails and other ferrous metals on surfaces to be painted with water-thinned paints shall be spot primed with aluminum paint.
- H. Prior Coating - Old paint surfaces on concrete, ferrous metal, and nonferrous metal shall be prepared by abrasive blast cleaning in accordance with proper SSPC method for the service.
- I. Touchup - Any abraded areas of shop or field applied coatings shall be touched up with the same type of shop or field applied coating, even to the extent of applying an entire coating, if necessary. Touchup coatings and surface preparations shall be in addition to and not considered as the first field coat.
- J. Casting (cast ferrous and nonferrous metals) - Surfaces of castings shall be prepared for painting by using a brush-applied filler and/or knife-applied filler, as required. These fillers are not to be used to conceal cracks, gasholes, or excessive porosity. Casting shall receive one coat of primer with a minimum thickness of 2 mils. Sufficient drying time must be allowed before further handling.
- K. Masonry - All masonry to be painted shall receive dampproofing, water repellent treatment, filler or protective coatings, depending upon exposure.
- L. Gypsum Board and Plaster - All gypsum board and plaster surfaces shall be sanded to remove rough edges and protrusions. Paint shall not be applied to plaster surfaces until surfaces have aged the minimum period of time prescribed by paint manufacturer supplying paint for this application. Before painting, such surfaces shall be dry, clean and free from grit, loose plaster and surface irregularities. Cracks and holes shall be repaired with approved patching materials, properly keyed to existing surfaces and sandpapered smooth.

### 3.03 APPLICATION

- A. CONTRACTOR shall be responsible for cleanliness of all painting operations and use covers and masking tape to protect work. CONTRACTOR shall protect not only his own work, but also all adjacent work and materials by adequate covering with drop cloths.
- B. CONTRACTOR shall maintain a daily epoxy coatings induction record (log) showing each epoxy paint mixing event in the format demonstrated at the end of this section. A signed copy of this log shall be turned over to the ENGINEER's field representative before the end of each working day during which epoxy coatings are mixed or applied.
- C. Any unwanted paint shall be carefully removed without damage to finished paint or surface. If damage does occur, the entire surface adjacent to and including damaged area shall be repainted without visible lap marks.
- D. Do not use plumbing fixture or waste piping for mixing of paint or disposal of any refuse material. All waste shall be disposed of properly into a suitable receptacle located outside of building.
- E. All paint shall be applied without runs, sags, thin spots, or unacceptable marks. Paint shall be applied at the rate specified to achieve minimum dry mil thickness required. Additional coats of paint shall be applied, if necessary, to obtain dry film thickness specified.
- F. Application shall be by spraying where recommended by manufacturer. If material has thickened or must be diluted for application by spray gun, each coat shall be built up to the same film thickness achieved with undiluted brushed-on material. Where thinning is necessary, such thinning shall be done in strict accordance with manufacturer's instructions.
- G. A minimum of 24 hours drying time shall elapse between application of any two coats of paint on a particular surface, unless otherwise recommended by coating manufacturer. Longer drying times may be required for abnormal conditions in concert with manufacturer's recommendations.
- H. No painting whatsoever shall be accomplished in rainy or excessively damp weather when the relative humidity exceeds 85 percent, or when the general air temperature cannot be maintained at 50 degrees F (10 degrees C) or above throughout entire drying period.
- I. Apply color coding to all new plant piping, in accordance with Table A-3, Piping Color and Label Schedule. Plant piping shall be painted solid colors unless otherwise specified.
- J. On piping designated to receive identification bands, such band shall be 6 inches wide, neatly made by masking, and spaced at intervals of 30 inches on center, regardless of diameter of pipe being painted. Use approved precut and prefinished metal or plastic bands on piping in lieu of marked and painted bands, if approved by ENGINEER. PVC pipe shall be banded with colored bands in lieu of painting.

- K. Apply identification labels to all types and sections of piping, as outlined herein. Such labels shall be in form of plain Gothic Capital, upper case block lettering giving name of pipe content in full and showing direction of flow by arrows. Arrow to match letter type and size. All lettering shall have an overall height in inches, in accordance with the following table:

Diameter of Pipe or Pipe Covering	Height of Lettering
3/4 to 1-3/8 inches	1/2 inch
1-1/2 to 2-3/8 inches	3/4 inch
2-1/2 to 7-7/8 inches	1-1/2 inches
8 to 10 inches	2-1/2 inches
Over 10 inches	3 inches

- L. Piping labels shall be located as follows:
1. Adjacent to each valve and fitting (except at pump suction and discharge connections where labels are required on headers only).
  2. At each branch and riser take-off.
  3. At each pipe passage through wall, floor or ceiling.
  4. Maximum distance between labels shall be 10 feet on all non-potable water, chemical piping, and on all chlorine solution lines with a minimum of two labels in each room, gallery, or tunnel. Maximum distance between labels on all other piping runs shall be 20 feet.
- M. Identification lettering shall be located midway between color coding bands where possible and shall be properly inclined to pipe axis to facilitate easy reading. In the event lettering and arrow identifications are required for piping less than 3/4-inch in diameter, the CONTRACTOR shall furnish and attach approved color coded tags where instructed.

#### 3.04 FINISHING SHOP PAINTED MECHANICAL AND ELECTRICAL EQUIPMENT

- A. All fabricated steel work and equipment delivered to job site shall receive at factory at least one shop coat of approved prime paint in concert with paint system required by these specifications. Surface preparation prior to shop painting shall be scheduled in Table A-1. All shop-painted items shall be properly packaged and stored until they are incorporated in work. Any painted surfaces that are damaged during handling, transportation, storage, or installation shall be cleaned, scraped, and patched before field painting begins so that work shall be equal to original painting at shop. Equipment or steel work that is to be assembled on the site shall likewise receive a minimum of one shop coat of paint at factory. Paint and surface preparation used for shop coating shall be identified on equipment shop drawings submitted to ENGINEER.
- B. Where exact identity of shop primer cannot be determined, or where primer differs from that specified, CONTRACTOR shall perform blast cleaning appropriate for service, followed by specified paint system. In lieu of above, CONTRACTOR has the option of shipping bare metal to job site and performing appropriate blast cleaning, followed by field prime coat of specified material immediately thereafter.

#### 3.05 FIELD QUALITY CONTROL

- A. Prior to receiving a Certificate of Substantial Completion, CONTRACTOR shall arrange for manufacturer to inspect the application of his product and shall submit his report to ENGINEER identifying products used and verifying that said products were properly applied and that paint systems were proper for the exposure and service. The manufacturer's representative shall also certify that all coats in each system are compatible with one another.

- B. Each field coat of priming and finishing paint shall be inspected by the ENGINEER or his authorized representative before the succeeding coat is applied. The CONTRACTOR shall follow a system of tinting successive paint coats so that no two coats for a given surface are exactly the same color. Areas to receive black protective coatings shall be tick-marked with white or actually gaged as to thickness when finished.

TABLE A-1

COATING SYSTEM SCHEDULE

Clay Brick, Exterior

SYSTEM B-1	TNEMEC	DUPONT	REMARKS
Surface preparation	Brush down with stiff bristle broom. Clean and dry (existing brick: low-pressure application of biodegradable detergent followed by 4,000 psi pressure wash)	--	Allow mortar joints to cure 28 days prior to beginning coating operations
Prime coat	Series 633 – Prime-A-Pell H2O 125 – 150 sq. ft. per gallon	--	--
Intermediate coat	Series 617-Conformal Stain WB 150 – 200 sq. ft. per gallon	--	--
Finish coat	Series 617-Conformal Stain WB 150 – 200 sq. ft. per gallon	--	--

Existing Clay Brick, Interior

SYSTEM B-2	TNEMEC	DUPONT	REMARKS
Surface preparation	Remove existing paint with 4,000 psi pressure wash	--	Allow brick to dry completely before application of new coatings
Prime coat	Series N69 Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	--
Intermediate coat	--	--	--
Finish coat	Series N69 Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	Total DFT - 6.0 mils minimum

Non-Submerged Concrete Walls and Ceilings - Interior (paint only when scheduled in Table A-2 or on the architectural drawings)

SYSTEM C-1	TNEMEC	DUPONT	REMARKS
Surface preparation	Clean and dry	Clean and dry	Allow concrete to cure 28 days prior to beginning coating operations
Prime coat	Series N69 Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	--
Intermediate coat	--	--	--
Finish coat	Series N69 Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	Total DFT - 8.0 mils minimum

Concrete in Contact With Sewage (paint only when scheduled in Table A-2 or on the architectural drawings)

SYSTEM C-2	TNEMEC	DUPONT	REMARKS
Surface preparation	Brush blast	Brush blast	Remove all blasting residue prior to beginning coating operations after concrete cured 28 days.
Prime coat	--	CORLAR 2.1 ST 5.0-6.0 mils	--
Intermediate coat	--	CORLAR 2.1 ST 5.0-6.0 mils	--
Finish coat	46H-413 Hi-Build Tneme-Tar 16.0-20.0 mils	CORLAR 2.1 ST 5.0-6.0 mils	Top of wall to 3 ft. below water line. Total DFT = 16.0 mils minimum

Concrete Block, Open Porous or Rough Masonry - Interior

SYSTEM C-3	TNEMEC	DUPONT	REMARKS
Surface preparation	Brush down with stiff bristle broom. Clean and dry.	Brush down with stiff bristle broom. Clean and dry	Allow mortar joints to cure 28 days prior to beginning coating operations
Prime coat	130-6602 Enviro-Fill 100-120 sq.ft. per gal.	CORLAR 2.1 ST 6.0-8.0 mils	Fill all voids
Intermediate coat	Series N69 Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	--
Finish coat	Series N69 Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	Total DFT - 16 mils minimum

Concrete - Exterior (paint only when scheduled in Table A-2 or in the architectural drawings)

SYSTEM C-5	TNEMEC	DUPONT	REMARKS
Surface preparation	Clean and dry	Clean and dry	Allow concrete to cure 28 days prior to beginning coating operations
Prime coat	Series 157-Color Enviro-Crete 111-148 sq.ft. per gal.	CORLAR 2.1 ST 6.0-8.0 mils	--
Intermediate coat	--	72P DTM Acrylic 2.0-3.0 mils	--
Finish coat	Series 157-Color Enviro-Crete 111-148 sq.ft. per gal.	72P DTM Acrylic 2.0-3.0 mils	Total DFT - 12.0 mils minimum



Concrete in Contact With Raw or Potable Water (paint only when scheduled in Table A-2 or in the architectural drawings)

SYSTEM C-6	TNEMEC	DUPONT	REMARKS
Surface preparation	Brush blast	Brush blast	Allow concrete to cure 28 days prior to beginning coating operations
Prime coat	Series N140-158L Pota-Pox Plus 214-357 sq.ft. per gal.	Corlar 525-450TL Epoxy tank lining 180-300 sq.ft. per gal.	--
Intermediate coat	Series N140-1255 Pota-Pox Plus 178-268 sq.ft. per gal.	Corlar 525-451TL Epoxy tank lining 150-225 sq.ft. per gal.	--
Finish coat	Series N140-158L Pota-Pox Plus 178-268 sq.ft. per gal.	Corlar 525-450TL Epoxy tank lining 150-225 sq.ft. per gal.	Total DFT = 14.0 mils minimum

#### Non-Submerged Masonry Walls - Glazed Wall Finish - Interior

SYSTEM C-7	TNEMEC	DUPONT	REMARKS
Surface preparation	Brush down with stiff bristle broom. Clean and dry	--	Allow concrete to cure 28 days prior to beginning coating operations
Prime coat	Series 83-Color Ceramlon II 110-125 sq.ft. per gal.	CORLAR 2.1 ST 6.0-8.0 mils	--
Intermediate coat	--	--	--
Finish coat	Series 83-Color Ceramlon II 125-150 sq.ft. per gal.	CORLAR 2.1 ST 6.0-8.0 mils	Total DFT - 16.0 mils minimum

#### Concrete Floors - Interior

SYSTEM C-8	TNEMEC	DUPONT	REMARKS
Surface preparation	Brush down with stiff bristle broom. Clean and dry. Remove loose coatings by hand scraping. Prepare bare concrete in accordance with SSPC-SP13. Sand remaining coatings to uniformly dull gloss. Clean and dry.	--	
Spot prime coat	Series 201 Epoxoprime 134-267 sq.ft. per gal.	--	Apply to all bare concrete.
Spot intermediate coat	Series 297-color Enviro-Glaze 305-366 sq.ft. per gal.	--	Apply to all bare concrete.
Finish coat	Series 297-color Enviro-Glaze 305-366 sq.ft. per gal.	--	Apply to entire interior floor surface.

## Existing Painted Interior Masonry Walls

SYSTEM C-8	TNEMEC	DUPONT	REMARKS
Surface preparation	Wash with biodegradable detergent. Rinse scrape to remove loose paint and feather edges.	--	
Prime coat	Series 113 HB. Tneme-Tufcoat 2.0-3.0 mils DFT at 236-350 sq.ft. per gal.		
Intermediate coat	N/A		
Finish coat	Series 113 HB. Tneme-Tufcoat 2.0-3.0 mils DFT at 236-350 sq.ft. per gal.		

## Non-Submerged Ferrous Metal

SYSTEM M-1	TNEMEC	DUPONT	REMARKS
Surface preparation	SSPC-SP6 Commercial blast	SSPC-SP6 Commercial blast	Shop
Prime coat	Series 4-56 Versare Primer 2.0-3.0 mils	681 FD Alkyd phenolic 2.0-3.0 mils	Shop
Intermediate coat	Series 23-Color Enduratone 2.0-3.0 mils	Dulux 31P SG Alkyd enamel	--
Finish coat	Series 23-Color Enduratone 2.0-3.0 mils	Dulux 31P SG Alkyd enamel	Total DFT = 7.5 mils minimum

## General Ferrous Metal - Interior

SYSTEM M-2	TNEMEC	DUPONT	REMARKS
Surface preparation	SSPC-SP6 Commercial blast	SSPC-SP6 Commercial blast	Shop
Prime coat	Series N69-1211 Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	Shop
Intermediate coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	--
Finish coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	Total DFT - 12.0 mils minimum

## Submerged Ferrous Metal

SYSTEM M-3	TNEMEC	DUPONT	REMARKS
Surface preparation	SSPC-SP10 Near White blast	SSPC-SP5 White blast	--
Prime coat	Series N69-1211 Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	Shop
Intermediate coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	--
Finish coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	Total DFT = 12.0 mils minimum

General Ferrous Metal - Exterior

SYSTEM M-4	TNEMEC	DUPONT	REMARKS
Surface preparation	SSPC-SP6 Commercial blast	SSPC-SP6 Commercial blast	Shop
Prime coat	Series N69-1211 Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	Shop
Intermediate coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	--
Finish coat	Series 1075-Color Endura-Shield II 2.0-3.0 mils	IMRON 2.8 HG 2.0-3.0 mils	Total DFT = 10.5 mils minimum

Ferrous Metal Below Grade

SYSTEM M-5	TNEMEC	DUPONT	REMARKS
Surface preparation	SSPC-SP6 Commercial blast	SSPC-SP6 Commercial blast	--
Prime coat	--	CORLAR 2.1 ST 5.0-6.0 mils	--
Intermediate coat	--	CORLAR 2.1 ST 5.0-6.0 mils	--
Finish coat	46H-413 Hi-Build Tneme-Tar 16.0-20.0 mils	CORLAR 2.1 ST 5.0-6.0 mils	Total DFT - 16.0 mils minimum

Ferrous Metal Moving Parts Submerged

SYSTEM M-6	TNEMEC	DUPONT	REMARKS
Surface preparation	SSPC-SP6 Commercial blast	SSPC-SP6 Commercial blast	Shop
Prime coat	Series N69-1211 Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	--
Intermediate coat	--	--	--
Finish coat	--	--	Total DFT = 4.0 mils minimum

Ferrous Metal Submerged in Raw or Potable Water

SYSTEM M-7	TNEMEC	DUPONT	REMARKS
Surface preparation	SSPC-SP10 Near White blast	SSPC-SP10 Near White blast	--
Prime coat	Series N140-158L Pota-Pox Plus 3.0-5.0 mils	Corlar 525-450 TL Epoxy tank lining 180-300 sq.ft. per gal	--
Intermediate coat	Series N140-1255 Pota-Pox Plus 4.0-6.0 mils	Corlar 525-451 TL Epoxy tank lining 150-225 sq.ft. per gal.	--
Finish coat	Series N140-158L Pota-Pox Plus 4.0-6.0 mils	Corlar 525-450 TL Epoxy tank lining 150-225 sq.ft. per gal.	Total DFT - 14.0 mils minimum

#### Uncertain Base Coat

SYSTEM M-8	TNEMEC	DUPONT	REMARKS
Surface preparation	SSPC-SP1 Solvent cleaning and SSPC-SP2 Hand tool cleaning	SSPC-SP1 Solvent cleaning and SSPC-SP2 Hand tool cleaning	Remove grease and oil. Scuff sand to dull gloss
Prime coat	Series 1 Purple-Prime 2.5-3.5 mils	CORLAR 2.1 ST 3.0-5.0 mils	Follow with appropriate system for exposure.
Intermediate coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	--
Finish coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	Total DFT - 11.0 mils minimum

#### Aluminum Surfaces in Contact with Concrete

SYSTEM M-9	TNEMEC	DUPONT	REMARKS
Surface preparation	SSPC-SP1 Solvent cleaning	SSPC-SP1 solvent cleaning	--
Prime coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	--
Intermediate coat	--	--	--
Finish coat	--	--	Total DFT - 4.0 mils minimum

#### Interior Insulated Piping

SYSTEM M-10	TNEMEC	DUPONT	REMARKS
Surface preparation	Clean and dry	Clean and dry	--
Prime coat	Series 6-Color Tneme-Cryl 2.0-3.0 mils	72P Acrylic 2.0-3.0 mils	--
Intermediate coat	--	--	--
Finish coat	Series 6-Color Tneme-Cryl 2.0-3.0 mils	72P Acrylic 2.0-3.0 mils	Total DFT = 5.0 mils minimum

#### Non-Submerged Ferrous Metal - Extra Corrosion Protection - Exterior

SYSTEM M-11	TNEMEC	DUPONT	REMARKS
Surface preparation	SSPC-SP6 Commercial blast	SSPC-SP6 Commercial blast	Shop
Prime coat	90-97 Tneme-Zinc 2.5-3.5 mils	Imron 62 ZF 3.0-4.0 mils	Shop
Intermediate coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	--
Finish coat	Series 1075-Color Endura-Shield II 2.0-3.0 mils	IMRON 2.8 HG 2.0-3.0 mils	Total DFT - 9.5 mils minimum

Nonferrous Metal - Interior

SYSTEM M-12	TNEMEC	DUPONT	REMARKS
Surface preparation	SSPC-SP1 solvent cleaning	SSPC-SP1 solvent cleaning	--
Prime coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	--
Intermediate coat	--	--	--
Finish coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	Total DFT = 8.0 mils minimum

Nonferrous Metal - Exterior

SYSTEM M-13	TNEMEC	DUPONT	REMARKS
Surface preparation	SSPC-SP1 solvent cleaning	SSPC-SP1 solvent cleaning	--
Prime coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	--
Intermediate coat	--	--	--
Finish coat	Series 1075-Color Endura-Shield II 2.0-3.0 mils	IMRON 2.8 HG 2.0-3.0 mils	Total DFT - 6.5 mils minimum

Galvanized Steel - Exterior

SYSTEM M-14	TNEMEC	DUPONT	REMARKS
Surface preparation	SSPC-SP7 Brush-off blast	SSPC-SP7 Brush-off blast	--
Prime coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	--
Intermediate coat	--	--	--
Finish coat	Series 1075-Color Endura-Shield II 2.0-3.0 mils	IMRON 2.8 HG 2.0-3.0 mils	Total DFT = 6.5 mils minimum

# Galvanized Steel - Interior

SYSTEM M-15	TNEMEC	DUPONT	REMARKS
Surface preparation	SSPC-SP1 Solvent cleaning to remove soluble contaminants. SSPC-SP3 Power tool cleaning to remove insoluble contaminants	SSPC-SP1 Solvent cleaning to remove soluble contaminants. SSPC-SP3 Power tool cleaning to remove insoluble contaminants	SSPC-SP1 preferred method is steam cleaning or power wash with degreaser/fresh water rinse
Prime coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	--
Intermediate coat	--	--	--
Finish coat	Series N69-color Hi-Build Epoxoline II 3.0-5.0 mils	CORLAR 2.1 ST 3.0-5.0 mils	Total DFT - 8.0 mils minimum

# Gypsum Board or Plaster Walls, Ceiling and Soffits - Interior/Exterior

SYSTEM G-1	TNEMEC	DUPONT	REMARKS
Surface preparation	Clean and dry	Clean and dry	--
Prime coat	Series 6-Color Tneme-Cry 12.0-3.0 mils	72P Acrylic 2.0-3.0 mils	--
Intermediate coat	--	--	--
Finish coat	Series 6-Color Tneme-Cry 12.0-3.0 mils	72P Acrylic 2.0-3.0 mils	Total DFT = 5.0 mils minimum

# Gypsum Board, Walls, Ceilings, and Soffits, High Performance - Interior

SYSTEM G-2	TNEMEC	DUPONT	REMARKS
Surface preparation	Clean and dry	Clean and dry	--
Prime coat	51-792 PVA Sealer 1.0-2.0 mils	310 Acrylic 2.0-3.0 mils	--
Intermediate coat	Series N69-Color Hi-Build Epoxoline II 2.0-3.0 mils	CORLAR 2.1 ST 2.0-3.0 mils	--
Finish coat	Series N69-Color Hi-Build Epoxoline II 2.0-3.0 mils	CORLAR 2.1 ST 2.0-3.0 mils	Total DFT - 6.5 mils minimum

# Natural Wood - Interior

SYSTEM W-1	PRATT & LAMBERT	PPG	REMARKS
Surface preparation	Clean and dry	Clean and dry	--
Prime coat	Varmor CF	77-1 Sealer	--
Intermediate coat	Varmor CF Satin	77-9 Rez-Satin	--
Finish coat	Varmor CF Satin	77-9 Rez-Satin	--

Wood - Oil Base Stain - Exterior Semi-Transparent

SYSTEM W-2	PRATT & LAMBERT	OLYMPIC	REMARKS
Surface preparation	Clean and dry	Clean and dry	--
Prime coat	P&L Rustic	Semi-transparent	--
Intermediate coat			--
Finish coat	P&L Rustic	Semi-transparent	--

Wood - Oil Base Stain - Exterior Solid Color

SYSTEM W-3	TNEMEC	DUPONT	REMARKS
Surface preparation	Clean and dry	Clean and dry	--
Prime coat	P&L Solid Hide	Solid color	--
Intermediate coat			--
Finish coat	P&L Solid Hide	Solid color	--

Wood - Painted Exterior

SYSTEM W-4	TNEMEC	DUPONT	REMARKS
Surface preparation	Clean and dry	Clean and dry	--
Prime coat	Series 36-603 Uncercoater 2.0-3.0 mils	310 Acrylic 2.0-3.0 mils	--
Intermediate coat	Series 6-Color Tneme- Cryl 2.0-3.0 mils	Tufcoat 72P DTM Acrylic 2.0-3.0 mils	--
Finish coat	Series 6-Color Tneme- Cryl 2.0-3.0 mils	Tufcoat 72P DTM Acrylic 2.0-3.0 mils	Total DFT - 7.5 mils minimum

NOTE: Table A-1 and the Equipment Finish Schedule (Table A-2) are not intended to list every structure or equipment item to be painted. All new and existing structures, equipment, and appurtenances including all items furnished under the contract shall be painted by the CONTRACTOR, in accordance with the most applicable category from Table A-1. New and existing concrete tanks are not to be painted unless specifically identified in the following tables or on the architectural drawings.

Note: For application and curing at temperatures of 35 to 50 degrees F, use N69F Hi-Build Epoxoline II in lieu of N69 Hi-Build Epoxoline II and N140F Pota-Pox Plus in lieu of N140 Pota-Pox Plus.

TABLE A-2

EQUIPMENT FINISH SCHEDULE

ITEM NAME	PAINT SYSTEM NO.	COLOR <sup>(1)</sup>
Valves (plug, etc.)	M-2	Match pipe color
Sluice gates	M-3	As directed by manufacturer
Thickened sludge pumps	M-3	Matched ECWA current color
Water flow meters	M-2	Match pipe color
Wall sleeves (interior portion only)	M-5	Black
Submerged ductile iron and steel pipe, supports, valves	M-3	Black
Non-submerged interior ductile iron and steel pipe, supports, valves	M-2	See pipe paint schedule
PVC pipe and accessories	Do not paint plastics	See pipe paint schedule for labels
Miscellaneous interior non-submerged ferrous metal	M-2	As directed by ENGINEER, if not called out
Submersible pumps	M-3	As directed by manufacturer

- (1) All colors shall be verified by OWNER from manufacturer's standard colors, prior to painting. In general, colors shall match OWNER'S existing color scheme for various unit processes and piping and shall be in accordance with the Ten-States Standards.
- (2) Paint 1/2-inch stripe at seam between existing paint and new (approximately 3 feet) AFF. Stripe color to be selected by ENGINEER from manufacturer's standard colors.



TABLE A-3

PIPING COLOR AND LABEL SCHEDULE

LEGEND	LABEL COLOR	PIPE MATERIAL	PIPE COLOR <sup>(1)</sup>
Potable water	Dark blue with black letter	DIP/PVC	Dark Blue/Do not paint PVC
Plant water	Light blue with white letter	DIP/PVC	Light Blue/Do not paint PVC
Filter Backwash Residuals / Coagulation Basin Dewatering Residuals piping	Light brown with black letter	DIP	Light Brown
Filter Backwash Residuals / Coagulation Basin Blowdown Residuals piping	Light brown with black letter	DIP	Light Brown
Distribution Box	Light brown with white letter	DIP	Dark Brown
Thickener-Clarifier	Light brown with white letter	DIP/carbon steel	Light Brown
Thickened Sludge Piping	Dark brown with white letter	DIP	Dark Brown
Polymer Feed Line	Orange with white letter	PVC	Do Not Paint
Belt Filter Press	Light brown with white letter	DIP/carbon steel	Light Brown

- (1) All colors shall be verified by OWNER from manufacturer's standard colors, prior to painting. In general, colors shall match OWNER'S existing color scheme for various unit processes and piping and shall be in accordance with the Ten-States Standards.
- (2) Submit manufacturer's color swatch for ENGINEER approval.
- (3) Paint exposed exterior of steel pipe.

PAINT SCHEDULE

Reviewed by Paint Mfg. Rep. \_\_\_\_\_

Interior or Exterior Surfaces to Be Painted and Major Equipment	Surface Preparation		Paint System	Prime Coat Product, No. of Coats, Dry Film Thickness, and Coverage	Intermediate Coat		Finish Coat	Painting Status	Remarks (Any Special Treatment or Application Requirements)
	Shop	Field			Color	Color			

DAILY EPOXY COATINGS INDUCTION RECORD

Date	Product	Location	Ambient Temperature (°F)	Mix Start Time	Induction End Time	Total Induction Time Before Use

END OF SECTION

## SECTION 11201

### TUBE SETTLER SYSTEM

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. The CONTRACTOR shall provide tube settler modules, protective surface grating, baffles, effluent trough, structural support system, and all necessary accessories as shown on the Contract Drawings and as specified herein.

##### 1.02 RELATED SECTIONS

- A. Section 01331 - SHOP DRAWING PROCEDURES.
- B. Section 01620 - EQUIPMENT-GENERAL.
- C. Section 01781 - OPERATION AND MAINTENANCE DATA.
- D. Section 05521 - STRUCTURAL STEEL.
- E. Section 05500 - MISCELLANEOUS FABRICATIONS.
- F. Section 11335 - THICKENER-CLARIFIER SLUDGE COLLECTION EQUIPMENT.

##### 1.03 REFERENCES

- A. ASTM - American Society for Testing and Materials.
- B. NSF International - Standard 61.
- C. AISC Code of Standard Practice.
- D. AWS D 1.1 Structural Welding Code.

##### 1.04 SYSTEM DESCRIPTION

- A. Definitions
  - 1. Tube Settler Module – Tube settlers are comprised of multiple tubular channels sloped at an angle of approximately 60 degrees, which allows enhanced settling characteristics and accumulation of solids within the Thickener-Clarifiers. Modules will be 2 feet 6 inches in vertical height, 1 foot wide, up to 12-foot lengths. Tube settler modules shall have a minimum tube length of 34.5 inches. Modules shall be furnished by the tube settler manufacturer and installed by the CONTRACTOR as per the Contract Drawings. Modules shall be custom sized as required to fit the specific geometry of the Thickener-Clarifier tanks and support structure without field cutting of modules during installation.
  - 2. Protective Surface Grating – manufacturer's standard, to absorb hydraulic impact (during washdowns), and to provide operator access, a protective layer from foot traffic, and added UV protection to tube settler area. Grating shall be furnished by the tube settler manufacturer and installed by the CONTRACTOR as per the Contract Drawings.
  - 3. Support System – Structural system designed to support tube settlers, baffles, and troughs as required. Support system shall be furnished by the tube settler manufacturer and installed by the CONTRACTOR as per the Contract Drawings.

4. Baffle System – System to direct water through tube settler area. Baffle system shall be furnished by the tube settler manufacturer and installed by the CONTRACTOR as per the Contract Drawings. Baffle system shall be designed in conjunction with the support system
  5. Trough/Weir System – Effluent launders to remove clarified water from Thickener-Clarifiers. Existing trough/weir system shall be reused. The dimensions of the trough/weir system shall be field verified by the CONTRACTOR. The CONTRACTOR is responsible for re-installation of the trough/weir system.
- B. Description of System - System includes tube settler modules, protective surface grating, baffles, weirs, and support structures.
- C. Interface with Adjacent System(s)
1. CONTRACTOR shall install tube settler system within each Thickener-Clarifier as per the Contract Drawings in coordination with the tube settler manufacturer.
  2. CONTRACTOR and tube settler manufacturer shall coordinate with Section 11335 to confirm that proper clearances are required between all components internal to the Thickener/Clarifiers, including but not limited to the trough/weir system, tube settlers, tube settler supports, influent piping, and rake arms.
- D. Tolerances
1. Top of adjacent tube modules shall be installed true level  $\pm 1/2$  inch in full length.
  2. A maximum 1/4-inch space is allowed between installed modules.
- E. Performance Requirements
1. Each tube shall have a cross sectional perimeter of approximately 8.0-10.0 inches to give a low Reynolds number and of an approximate triangular shape that allows rapid accumulation, concentration, and drainage of solids.
  2. Cross corrugation of tubes with mixing points within individual modules is not allowed.
  3. Reversal of tube direction between adjacent modules is not allowed.
  4. Protective surface grating shall not impact performance of tube settlers or cause physical damage to tube settler material.

#### 1.05 SUBMITTALS

- A. Submit shop drawings and manufacturer's instructions in accordance with Section 01331.
- B. Shop drawings and product data (materials and installation instructions) required for the following:
1. Tube settler modules.
  2. Protective surface grating.
  3. Support structure.
  4. Baffle(s).
  5. Interface and connections between the existing tank walls, new piping, and thickener/clarifier mechanisms.
- C. The CONTRACTOR shall provide product data, drawings and calculations as follows:
1. Basin design and layout of equipment indicating all dimensions.
  2. Trough calculation at maximum and design flow.
  3. List of spare parts which should be purchased and kept on hand.
  4. Complete shop drawings of all assembled equipment furnished.
  5. Connection locations and support attachment details.
  6. Manufacturer's literature and cut sheets for all equipment.
  7. Weights for major component and materials of construction.
  8. Statement indicating terms of the warranties.

- D. Submit operation and maintenance manuals in accordance with Section 01781. Operation and Maintenance Manuals shall include:
  - 1. Storage and installation procedures.
  - 2. Cleaning procedures.
- E. Documentation and Samples - At least 10 days prior to bid, submit to ENGINEER a 1-foot width x full height by minimum 2-foot long sample of tube module, a 2-foot x 2-foot sample of surface grating, and documentation of up-to-date structural testing. All samples to be retained by OWNER.
- F. Certificates - Provide current certificate that tube settler modules and surface grating are tested and certified ANSI/NSF Standard 61 Drinking Water System Components.
- G. Structural Support – CONTRACTOR shall submit the structural design for the tube settler support system. Tube settler manufacturer shall confirm loading criteria. Design shall be prepared by a Professional Engineer licensed in New York State. The OWNER will provide as-built/fabrication drawings of existing Thickener-Clarifier tanks for CONTRACTOR'S use in preparing the design.

#### 1.06 QUALITY ASSURANCE

- A. To assure system integrity and process responsibility, all items of equipment described in this section shall be manufactured by a single manufacturer regularly engaged in the production of this equipment who shall take responsibility for coordination of all components to assure proper functioning of the tube settler equipment as a system.
- B. Any costs resulting from changes to the structure, piping etc., required for tube settler system shall be borne by the CONTRACTOR.
- C. Tube settler module manufacturer shall have minimum 10 years continuous experience in manufacture and supply of tube settlers for municipalities and shall have at least 10 years' experience in the design and building of clarification equipment of the specified design.
- D. Installation Requirements
  - 1. Install tube settler system in accordance with manufacturer's written instructions.
  - 2. Tube settler system manufacturer shall provide services of qualified representative on site to provide instructions on installation, cutting, etc. according to Article 3.02.
- E. Source Quality Control
  - 1. Current certification of tube modules and surface grating as tested and certified with ANSI/NSF Standard 61 for use in potable water.
  - 2. All equipment to use potable grade material suitable for use in drinking water treatment plants.

#### 1.07 PRODUCT DELIVERY, STORAGE & HANDLING

- A. Tube modules shall be shipped and delivered to job site on pallets.
- B. All material and equipment shall be shipped, stored, handled, and installed in such a manner as to not degrade quality or serviceability.
- C. The tube settling modules shall not be stacked more than four high (8 ft.) (one over the other).
- D. All modules shall be stacked such that the PVC sheet planes are in a vertical position (similar to the manner of their placement inside the thickener/clarifier tanks).
- E. Modules shall not be stored in the open outdoors.

- F. Covers should be double sided such as a white on black. The white side, facing out, is used to reflect light away. Clear covers are prohibited. Black covers, facing out, will not be permitted.
- G. Covers cannot be wrapped tightly around the media. There should be at least a 6" air gap between the cover and top of media. The ends of the cover shall be securely anchored on all sides with at least a 12" air gap at the bottom. These covers shall provide shading while allowing air to pass through to prevent heat from building up.
- H. Modules shall be checked at least once a week. It is very possible that the covers can become loose over time due to wind or rain. A check of the stored area shall be done to make any minor repairs to the cover or to restack any modules that could have fallen.
- I. Tube modules shall remain on shipping pallets until ready to install.
- J. Any abusive handling of the modules shall not be permitted. CONTRACTOR shall be careful in placing the tube modules and avoid any damage to the corners and tube edges.
- K. Personnel shall not stand or walk directly on top of the modules.
- L. Media modules may get brittle at low temperatures or soft at high temperatures. Therefore, care should be used in the handling of modules.

#### 1.08 SPARE PARTS

- A. Spare Tube Modules - Furnish 10 full size (minimum 12-foot lengths) spare tube modules to OWNER.

#### 1.09 WARRANTY

- A. Provide equipment warranty in accordance with the General Conditions, Supplementary Conditions, and Section 01620.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Brentwood Industries, Inc.
- B. Meurer Research, Inc.
- C. Or approved equal.

## 2.02 EQUIPMENT CONSTRUCTION

### A. Design Conditions

Parameter	Units	Value
Total number of Thickener/Clarifiers	No.	2
Maximum flow rate per thickener/clarifier (2 thickener/clarifiers in service at max. flow rate)	gpm	120
Average flow rate per thickener/clarifier (2 thickener/clarifiers in service at avg. flow rate)	gpm	85
Maximum design loading rate through tube settlers (2 thickener/clarifiers in service at max. flow rate)	gpm/ft <sup>2</sup>	0.44
Average design loading rate through tube settlers (2 thickener/clarifiers in service at avg. flow rate)	gpm/ft <sup>2</sup>	0.31
Tube settler vertical height	in.	24
Minimum tube settling length	in.	34.5
Tube inclination from horizontal	deg.	60
Allowable truss spacing	ft.	8
No. of radial collection troughs per thickener/clarifier	No.	See Contract Drawings

### B. Tube Modules

- The tube modules shall be furnished by the tube settler manufacturer and installed by the CONTRACTOR as per the Contract Drawings.
- The tube settler modules shall consist of a number of sheets in which are molded a multiplicity of channels; said sheets bonded together to form the completed bundles of tubes. Each tube shall be closed along its sides so the flow cannot pass from one tube to another. "Tubes" which have open sides allowing "short circuits" from one tube to another are not acceptable.
- The tubes shall have a cross-sectional area of at least 4.0 square inches but not greater than 7.0 square inches and be oriented on an angle of approximately 60 degrees from the horizontal in order to promote gravity drainage of the solids collected on the tube bottoms. Modules consisting of tubes in alternating directions are not acceptable.
- Tube Settlers must be uni-directional and all tubes must be oriented in the same direction without exception.
- The tube settler modules shall be built up of a number of molded sheets of flame resistant, self-extinguishing, rigid and virgin PVC. Regrind material or ABS plastic shall not be allowed. Proof of virgin material for the specific lot will be required. The sheets shall be bonded together to form a durable homogenous structure with "whole" tubes running from the bottom of the module to the top eliminate mixing currents that could interfere with the settling process and thereby allow the escape of an excess amount of settleable solids. The molded sheets shall have the tube configuration molded integrally therein.
- Material shall be inert and resistant to naturally occurring constituents in water and to the normal dosage of water treatment chemicals required in the treatment process.
- Tube settler modules shall be tested and certified by NSF to ANSI/NSF Standard 61 Drinking Water System Components. Evidence of current certification must be included with submittal package and indelibly marked on the sheets of the modules.
- The tubes shall be molded of virgin PVC, conforming to commercial standard ASTM D1784:12344B, that has a finished thickness of 20 mils  $\pm$  0.003 inches for the formed sheets, and 25 mils  $\pm$  0.003 inches for the straight sheets. The plastic shall have a hardness on the Shore D scale of 110 per ASTM D-785. The material shall contain carbon black as a UV stabilizer.
- Structural integrity of an individual 1-foot wide module shall be maintained, with no influence of a protective surface grating, under a loading of 20 lbs. per square foot (psf) which includes the module dead weight plus a uniformly distributed load of 12 psf while bearing a movable live load of 250 lbs. concentrated over a 1 square foot area at the midpoint of the module span.

10. The modules shall be self-supporting. The protective surface grating is required to prevent damage to the tube settler edges and is not meant for foot traffic.
11. The maximum unsupported module span shall be 8 feet.
12. The completed modules shall be manufactured to the necessary widths and lengths to minimize field installation difficulties and field modifications.
13. The PVC sheet shall be prime, rigid PVC conforming to commercial standard ASTM D1784:12344B with the following properties.

Property	Test Method	Unit	Typical Value
Specific Gravity	D792	gm/cu.cm.	1.45 max.
Tensile Strength	D638/D882	psi	6,000 min.
Flexural Modulus	D790	psi	425,000 min.
Flexural Strength	D790	psi	11,000 min.
Elastic Modulus	D638/D882	psi	360,000 min.
Impact Resistance	D5420	in.lbs./mil	0.8 min.
Heat Deflection	D648	°F (264 psi)	158 min.
Flammability	D635		self-extinguishing less than 5 sec.

C. Protective Surface Grating

1. The surface grating shall be furnished by the tube settler manufacturer and installed by the CONTRACTOR as per the Contract Drawings.
2. The protective surface grating, when installed as per manufacturer's recommendations, shall provide a protective surface (for minimizing the hydraulic impact on the media during washdowns, etc.) on top of the tube settler media. Such grating shall be comprised of multiple square mesh openings, molded or interlocked together to provide a strong and light weight panel. In addition, each panel shall have a net weight of about 3 lbs. The grating panels will contact the media to provide an economical as well as an effective grating when the grating panels are placed on top of the tube settler media. Any grating heavier than the specified weight, or which can cause damage to the tube settlers shall not be acceptable.
3. The material shall be inert and resistant to naturally occurring constituents in water and wastewater.
4. Grating shall be installed in panels side-by-side and placed on top of the tube settler media. Each panel shall be snapped together with the adjacent panel with locks provided at the edges of each panel. The grating panels shall be placed on top of the media such that the grating is in contact with the media.
5. The grating system shall be designed to prevent damage to the tube settler media and allow for ease of placement and removal. Refer to the structural integrity of the tube modules for further information.

D. Support System

1. The support system shall be furnished by the tube settler manufacturer and installed by the CONTRACTOR.
2. The system shall be designed to attached/ anchor into the existing thickener-clarifier tanks.
3. The support system shall be constructed of 304 stainless steel or painted steel. Fabricate all structural steel components as shown on the Contract Drawings and to comply with AISC Code of Standard Practice.
4. The support structure shall be designed to support 200 pounds per linear foot of tube settler area which includes the module dead weight plus a concentrated load of 250 lbs. concentrated over a one sq. ft. area and any loads resulting from the troughs. The maximum deflection of the structure under full live load shall be 1/240 of the span.



5. Accurately cut and mill ends of members to provide neat appearance and to provide full contact of surfaces prior to welding and joining.
  6. Camber horizontal members to accommodate dead load deflection.
  7. Fabricate items with joints neatly fitted and secured.
  8. Grind exposed welds smooth and flush with adjacent surfaces.
  9. Where mechanically fastened, make exposed joints flush butt-type hair line joints.
  10. Where mechanical fastening in field, provide slotted holes.
  11. Supply components necessary for complete anchorage and fastening of metal fabrications.
  12. Fit and shop assemble as appropriate for delivery to site.
  13. Trough support posts and saddles shall be integral with the tube settler support structure.
  14. Supply components necessary for complete anchorage and fastening of metal fabrications.
  15. Fit and shop assemble as appropriate for delivery to site.
  16. Tube settler manufacturer shall certify that the support system provided will properly support the quantity and type of modules specified herein.
  17. The support system shall not conflict with the internal thickener/clarifier components, including but not limited to the trough/weir system, tube settlers, tube settler supports, influent piping, and rake arms.
- E. Baffles
1. The baffles and fasteners shall be furnished by the tube settler manufacturer and installed by the CONTRACTOR as per the Contract Drawings.
  2. The baffles shall attach to the support structure previously described, and include all necessary appurtenances and the baffle panels themselves. The tube settler manufacturer shall provide connection details and connections of the baffles to the support structure.
  3. All components of the baffle system shall be designed and fabricated by the tube settler manufacturer to insure a uniform fit and nicely finished appearance.
  4. The baffle panels shall be constructed of fiberglass reinforced polyester resin (FRP) a minimum of ¼ inch (average) thickness.
  5. The panel shall be of a dimension as indicated on the Contract Drawings. The panels, when mounted in their structural support system, shall be square and accurately sized to minimize gaps between the frame members and the panel.
- F. Troughs and Weirs
1. The existing troughs and weirs shall be used as specified in Section 11287.
  2. It is the responsibility of the CONTRACTOR to field verify the location of the troughs and weirs.
  3. The CONTRACTOR is responsible for all coordination with the Tube Settler Manufacturer regarding the existing troughs and weirs.
- G. Welding Materials
1. In accordance with AWS specifications.
  2. Compatible with materials being welded.

## PART 3 EXECUTION

### 3.01 EQUIPMENT INSTALLATION

- A. CONTRACTOR shall furnish and install the equipment according to the manufacturer's instructions and Section 01620. The method of installation shall be outlined by the tube settler manufacturer.
- B. Field cutting of the tube settler modules is not allowed.
- C. CONTRACTOR shall field verify all dimensions and elevations and shall notify ENGINEER of any specific design differences.

- D. CONTRACTOR shall layout all work prior to installation.
- E. CONTRACTOR shall protect adjacent surfaces, piping and other items.
- F. CONTRACTOR shall protect tube settler material as required by the manufacturer.
- G. CONTRACTOR shall make any and all necessary changes, modifications, and/or adjustments required to assure satisfactory operation.

3.02 SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. Provide the services of the tube settler manufacturer or their approved representative in accordance with Section 01620.

END OF SECTION

## SECTION 11287

### WEIR PLATES AND ACCESSORIES

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Furnish and install weirs complete with all necessary accessories and mounting fixtures for use in the Thickener-Clarifier Tanks No 1 and No 2, as shown on the Contract Drawings and as specified herein.

##### 1.02 RELATED SECTIONS

- A. Section 01331 - SHOP DRAWING PROCEDURES.
- B. Section 01620 - EQUIPMENT-GENERAL.
- C. Section 05500 - MISCELLANEOUS FABRICATIONS.
- D. Section 11201 - TUBE SETTLER SYSTEM.
- E. Section 11335 - THICKENER-CLARIFIER SLUDGE COLLECTION EQUIPMENT.

##### 1.03 REFERENCES

- A. ASTM A167.
- B. ASTM A276.

##### 1.04 SUBMITTALS

- A. Shop drawings in accordance with Section 01331.

##### 1.05 SPARE PARTS

- A. The CONTRACTOR shall furnish the following spare parts in clearly-identified containers:
  - 1. Washers - Two each type.
  - 2. Butt Plates - Two each type.
  - 3. Neoprene Gasket - 50 feet, continuous one-piece.

#### PART 2 PRODUCTS

##### 2.01 EQUIPMENT DESIGN

- A. Weir Plates
  - 1. Weir plates shall be fiberglass reinforced polyester resin (FRP) compression molded in matched metal die molds; provide all required lap plates, cover plates, and support brackets. Each weir plate shall be of the depth and overall length as indicated on the Contract Drawings, with the following properties.
    - a. Tensile strength (ASTM D 638): 14,000 psi.
    - b. Flexural strength (ASTM D 790): 25,000 psi
    - c. Flexural modulus (ASTM D 790): 1,000,000 psi.
  - 2. Plates fabricated from cut plate stock with cut edges, notches, etc. will not be accepted.

3. Each weir plate shall be a minimum of ¼ inch nominal thickness. Each weir plate shall be of a depth and overall height, as indicated on the Contract Drawings, and shall contain 90-degree V-notches where noted.
  4. Each weir plate shall be provided with mounting holes, as indicated on the Contract Drawings. All weirs shall be fastened a maximum of 18-inches on center, as shown on the Contract Drawings
  5. Weir plates shall not exceed 10 ft. in length.
  6. Furnish and install weir plates as shown on the Contract Drawings.
- B. Neoprene Gaskets
1. Neoprene gaskets for mounting of weir plates to walls and troughs shall be 1/4-inch thick.
  2. The neoprene gaskets shall be continuous one-piece gaskets running the entire length of walls and shall have a depth extending from the top of the wall or trough to the bottom of the weir plates.
- C. Design Details - Reference weir details shown on mechanical drawings.

## 2.02 FABRICATION REQUIREMENTS

- A. Fasteners
1. Fasteners shall be furnished by the weir plate manufacturer.
  2. Anchor bolts to secure weir plates to walls shall be Type 316 stainless steel, minimum diameter 5/8-inch according to Section 05500.
  3. Washers shall be Type 316 stainless steel and 5 inches minimum diameter, minimum thickness shall be 1/8-inch.

## PART 3 EXECUTION

### 3.01 EQUIPMENT INSTALLATION

- A. Weirs shall be installed at the elevations shown on the Contract Drawings with no more than ±1/16-inch variation.

### 3.02 FIELD TESTING AND INITIAL OPERATION

- A. All weir plate installations shall be leakage tested for four hours to assure a watertight installation.
- B. Supply all plugs, pumps, weirs, etc., necessary to conduct the tests.
- C. Tests shall be witnessed by ENGINEER.
- D. The leakage test shall consist of an exfiltration test wherein the particular distribution box or tank upon which the weir plate is installed shall be filled with water to top of weir plate.
- E. This water level shall be maintained throughout the test period.
- F. During the test period, any leakage from the structure that is associated with the weir plate installation shall be cause for failure of the leakage test.
- G. In the case of leakage test failure, the CONTRACTOR shall make all necessary repairs or replacements and shall repeat the leakage test until a satisfactory test is obtained.

END OF SECTION

## SECTION 11291

### SLIDE GATES

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Furnishing and installing aluminum slide gates, complete with all necessary accessories, for the new Distribution Box.

##### 1.02 RELATED SECTIONS

- A. Section 01331 - SHOP DRAWING PROCEDURES.
- B. Section 01620 - EQUIPMENT-GENERAL.
- C. Section 01781 - OPERATION AND MAINTENANCE DATA.
- D. Section 05500 - MISCELLANEOUS FABRICATIONS.
- E. Section 09900 - PAINTING.

##### 1.03 REFERENCES

ASTM A36	Structural Steel
ASTM A123	Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips
ASTM A575	Steel Bars, Carbon, Merchant Quality M-Grade
ASTM A576	Steel Bars, Carbon, Hot-Wrought, Special Quality
ASTM B209	Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B308	Aluminum Structural Shapes (Alloy 6061-T6)
ASTM D2000	Rubber Products

##### 1.04 PERFORMANCE REQUIREMENTS

- A. All slide gates shall meet the leakage requirements of AWWA Standard C501, latest edition.

##### 1.05 SUBMITTALS

- A. Section 01331 – Shop Drawing Procedures.
- B. Section 01620 - Equipment-General: Performance Affidavits, Operating Instructions, Standardization of Grease Fittings, Equipment Tests and Initial Operation.
- C. Shop Drawings: Submit the following:
  - 1. Fabrication, assembly and installation diagrams.
  - 2. Manufacturer's literature, illustrations, specifications and engineering data.
  - 3. Setting drawings, templates, and directions for the installation of anchor bolts and other anchorages.
  - 4. Deviations from the Contract Documents.

- D. Support Design Information: Submit for record purposes only the weight of each slide gate and expected opening and closing thrust loads on the supporting structure.
- E. Shop Test Results:
  - 1. Submit results of required shop tests.
- F. Field Test Results:
  - 1. Submit a written report giving the results of the field tests required.
- G. Operation and Maintenance Manuals:
  - 1. Submit complete Installation, Operation and Maintenance Manuals including, test reports, maintenance data and schedules, description of operation and spare parts information.
  - 2. Furnish Operation and Maintenance Manuals in conformance with the requirements of Section 01781, Operation and Maintenance Data.
- H. Lubricant Specification: Furnish a lubricant specification for the type and grade necessary to meet the requirements of the equipment.

#### 1.06 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
  - 1. Manufacturer shall have a minimum of five years of experience of producing substantially similar equipment and shall be able to show evidence of at least five installations in satisfactory operation for at least five years.
  - 2. Slide gates shall be the product of one manufacturer.
- B. Component Supply and Compatibility:
  - 1. Obtain all equipment included in this Section regardless of the component manufacturer from a single slide gate manufacturer.
  - 2. The slide gate equipment manufacturer shall prepare all Shop Drawings and other submittals for all components furnished under this Section.
  - 3. All components shall be specifically designed for the specified service and shall be integrated into the overall assembly by the slide gate equipment manufacturer.

#### 1.07 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling and Unloading:
  - 1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete in ample time to prevent delay of that Work.
  - 2. Handle all slide gates and appurtenances properly, in accordance with manufacturer's recommendations. Slide gates, which are distorted or otherwise damaged, will not be acceptable. Protect all bolt threads and ends from damage.
- B. Storage and Protection:
  - 1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
  - 2. Store all mechanical equipment in covered storage off the ground and prevent condensation.
- C. Acceptance at Site:
  - 1. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace loss and repair damage to new condition in accordance with manufacturer's instructions.

## 1.08 WARRANTY

- A. Provide equipment warranty in accordance with the General Conditions, Supplementary Conditions, and Section 01620.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Aluminum slide gates shall be manufactured by one of the following:
  - 1. Whipps, Inc. – Model 823-C
  - 2. Waterman Industries – Model A-250

### 2.02 GENERAL

- A. Gates shall be as specified herein and have the characteristics and dimensions shown on the Contract Drawings.
- B. Leakage shall not exceed 0.1 gpm/ft of wetted seal perimeter in seating head and unseating head conditions.
- C. The gate shall utilize self-adjusting seals. Gates that utilize adjustable wedges or wedging devices are not acceptable.
- D. All structural components of the frame and slide shall be fabricated of aluminum having a minimum thickness of 1/4-inch and shall have adequate strength to prevent distortion during normal handling, during installation and while in service.
- E. All welds shall be performed by welders with AWS D1.2 certification.
- F. Finish: Mill finish on aluminum. Welds shall be cleaned to provide a uniform finish. All iron and steel components shall be properly prepared and shop coated with a primer.
- G. Materials:

#### **Components**

Frame Guides, Yoke and Invert Member  
Slide and Stiffeners  
Stem  
Anchor Studs, Fasteners and Nuts  
Invert Seal (Upward Opening Gates Only)  
Seat/Seal and Facing Ultra-High Molecular Weight  
Lift Nuts  
Pedestal  
  
Operator Housing

#### **Materials**

6061-T6 Aluminum  
6061-T6 Aluminum  
Stainless Steel, Type 304, ASTM A276  
Stainless Steel, Type 316, ASTM A276  
Neoprene ASTM D-2000 or EPDM  
Polyethylene ASTM D4020  
Bronze ASTM B584  
6061-T6 Aluminum or Stainless Steel,  
Type 304L, ASTM A-276  
Cast aluminum or ductile iron

### 2.03 FRAME

- A. The frame guides, invert member and yoke members shall be constructed of extruded aluminum shapes with a minimum thickness of 1/4-inch.
  - 1. Frame design shall allow for embedded mounting or mounting directly to a wall with stainless steel anchor bolts and grout. Mounting style shall be as shown on the Contract Drawings.
  - 2. The frame guides shall have a minimum weight of 4 lbs per foot of length for wall mounted and 3 lbs per foot for embedded or in-channel mounted.

3. The frame guides shall extend to accommodate the entire height of the slide when the slide is in the fully opened position on upward opening slide gates or downward opening weir gates.
4. On self-contained gates, a yoke shall be provided across the top of the frame guides. The yoke shall be formed by two structural members affixed to the top of the guides to provide a one-piece rigid frame. The yoke shall be designed to allow removal of the slide.
5. A rigid extruded aluminum invert member shall be provided across the bottom of the opening. The invert member shall be of the flushbottom type on upward opening gates and shall have a minimum weight of 4 lbs per foot of length for wall mounted and 3 lbs per foot for embedded or in-channel mounted.
6. A rigid extruded aluminum top seal member shall be provided across the top of the opening on gates designed to cover submerged openings.
7. A rigid extruded aluminum member shall be provided across the invert of the opening on downward opening weir gates.

## 2.04 SLIDE

- A. The slide and reinforcing stiffeners shall be constructed of aluminum plate with a minimum thickness of 1/4-inch.
  1. The slide shall not deflect more than 1/360 of the span or 1/16 inch, whichever is smaller, under the maximum design head.
  2. The portion of the slide that engages the frame shall have a minimum material thickness of 1/2-inch.
  3. Reinforcing stiffeners shall be welded to the slide and mounted horizontally. Two vertical stiffeners shall be welded on the outside of the horizontal stiffeners for additional reinforcement.
  4. The stem connector shall be constructed of two angles or plates. The stem connector shall be welded to the slide. A minimum of two bolts shall connect the stem to the stem connector.

## 2.05 SEALS

- A. All gates shall be provided with a self-adjusting seal system to restrict leakage in accordance with the requirements listed in this specification.
  1. All gates shall be equipped with UHMW polyethylene seat/seals to restrict leakage and to prevent metal-to-metal contact between the frame and slide.
  2. The seat/seals shall extend to accommodate the 1-1/2 x the height of the slide when the slide is in the fully closed or fully opened position.
  3. All upward opening gates shall be provided with a resilient seal to seal the bottom portion of the gate. The seal shall be attached to the invert member of the frame or the bottom of the slide.
  4. All downward opening weir gates shall be provided with UHMW polyethylene seat/seals across the invert member.
  5. The seal system shall be durable and shall be designed to accommodate high velocities and frequent cycling without loosening or suffering damage.
  6. The seals shall be mounted so as not to obstruct the water way opening.
  7. Gates that utilize rubber "J" seals or "P" seals are not acceptable.
  8. Slide Gate Options
    - a. Flush Bottom Seal
      - 1) Gates shall be provided with a specially molded compressible resilient seal mounted on the bottom of the slide or attached to the invert member of the frame to provide a flush bottom closure.
      - 2) The shape of the seal shall produce a seating surface having a minimum width of 3/4-inch and the seal shall extend into the guide.
      - 3) The vertical face of the seal shall be in contact with the seating surface of the guide to provide a proper seal at the corners.



## 2.06 STEM

- A. A threaded operating stem shall be utilized to connect the operating mechanism to the slide. On rising stem gates, the threaded portion shall engage the operating nut in the manual operator or motor actuator. On non-rising stem gates, the threaded portion shall engage the nut on the slide.
1. The threaded portion of the stem shall have a minimum outside diameter of 1-1/2 inches. Stem extension pipes are not acceptable.
  2. The stem shall be constructed of solid stainless steel bar for the entire length, the metal having a tensile strength of not less than 75,000 psi.
  3. The stem shall be threaded to allow full travel of the slide unless the travel distance is otherwise shown on the Contract Drawings.
  4. Maximum L/R ratio for the unsupported part of the stem shall not exceed 200.
  5. In compression, the stem shall be designed for a critical buckling load caused by a 40 lb effort on the crank or handwheel with a safety factor of 2, using the Euler column formula.
  6. The stem shall be designed to withstand the tension load caused by the application of a 40 lb effort on the crank or handwheel without exceeding 1/5 of the ultimate tensile strength of the stem material.
  7. The threaded portion of the stem shall have machine rolled threads of the full Acme type with a 16 microinch finish or better. Stub threads are not acceptable.
  8. Stems of more than one section shall be joined by stainless steel or bronze couplings. The coupling shall be bolted to the stems.
  9. Stems, on manually operated gates, shall be provided with adjustable stop collars to prevent over closing of the slide.

## 2.07 STEM GUIDES

- A. Stem guide shall be provided when necessary to ensure that the maximum L/R ratio for the unsupported part of the stem is 200 or less.
1. Stem guide brackets shall be constructed of aluminum or stainless steel with a minimum thickness of 1/4-inch and shall be outfitted with UHMW or bronze bushings.
  2. Adjustable in two directions.

## 2.08 MANUAL OPERATORS

- A. Unless otherwise shown on the Contract Drawings, gates shall be operated by a manual handwheel. The operator shall be mounted on the yoke of self-contained gates or on the pedestal of non-self-contained gates.
1. The gate manufacturer shall select the proper gear ratio to ensure that the gate can be operated with no more than a 40 lb. effort when the gate is in the closed position and experiencing the maximum operating head.
  2. An arrow with the word "OPEN" shall be permanently attached or cast onto the operator to indicate the direction or rotation to open the gate.
  3. Handwheel operators shall be fully enclosed and shall have a cast aluminum housing.
    - a. Handwheel operators shall be provided with a threaded cast bronze lift nut to engage the operating stem.
    - b. Handwheel operators shall be equipped with roller bearings above and below the operating nut.
    - c. Positive mechanical seals shall be provided above and below the operating nut to exclude moisture and dirt and prevent leakage of lubricant out of the hoist.
    - d. The handwheel shall be removable and shall have a minimum diameter of 15 inches.
  4. All gates having widths in excess of 72 inches and widths greater than twice their height shall be provided with two gearboxes connected by an interconnecting shaft for simultaneous operation.
    - a. Interconnecting shafting shall be constructed of aluminum or stainless steel.
    - b. Flexible couplings shall be provided at each end of the interconnecting shaft. Couplings shall be stainless steel or non-metallic.
    - c. One crank shall be provided to mount on the pinion shaft of one of the gearboxes.

5. An extended operator system utilizing chain and sprockets shall be furnished by the manufacturer when the centerline of the crank or handwheel, on a non-geared operator, is located over 48-in above the operating floor. Chain wheels are not acceptable.
  - a. A removable aluminum or stainless steel cover shall be provided to enclose chain and sprockets.
  - b. The extended operator system shall lower the centerline of the pinion shaft to 36-in above the operating floor.
  - c. A handwheel may be utilized in conjunction with a gearbox in lieu of the extended operator system if the centerline of the pinion shaft is 60-in or less above the operating floor.
6. Pedestals shall be constructed of aluminum.
  - a. The pedestal height shall be such that the handwheel or pinion shaft on the crank-operated gearbox is located approximately 36-in above the operating floor.
  - b. Wall brackets shall be used to support floor stands where shown on the Contract Drawings and shall be constructed of aluminum or stainless steel.
  - c. Wall brackets shall be reinforced to withstand in compression at least two times the rated output of the operator with a 40 lb effort on the crank or handwheel.
  - d. The design and detail of the brackets and anchor bolts shall be provided by the gate manufacturer and shall be approved by the ENGINEER. The gate manufacturer shall supply the bracket, anchor bolts and accessories as part of the gate assembly.
7. Operators shall be equipped with fracture-resistant clear butyrate or lexan plastic stem covers.
  - a. The top of the stem cover shall be closed.
  - b. The bottom end of the stem cover shall be mounted in a housing or adapter for easy field mounting.
  - c. Stem covers shall be complete with indicator markings to indicate gate position.
8. When shown on the Contract Drawings, provide 2-inch square nut with a non-rising stem.
  - a. The square nut shall be constructed of bronze.
  - b. The floor box, if required, shall be constructed of stainless steel or cast iron and shall be set in the concrete floor above the gate as shown.
  - c. Provide one aluminum or stainless steel T-handle wrench for operation.

## 2.09 ANCHOR BOLTS

- A. Anchor bolts shall be provided by the gate manufacturer for mounting the gates and appurtenances.
  1. Quantity and location shall be determined by the gate manufacturer in coordination with the ENGINEER.
  2. If epoxy type anchor bolts are provided, the gate manufacturer shall provide the studs and nuts.
  3. Anchor bolts shall have a minimum diameter of 1/2-inch.

## 2.10 DATA NOT SPECIFIED

- A. Data not specified in this Section shall be the manufacturer's standard for the size of equipment specified.

# PART 3 EXECUTION

## 3.01 EQUIPMENT INSTALLATION

- A. CONTRACTOR shall furnish and install the equipment according to the manufacturer's instructions and Section 01620.
- B. CONTRACTOR shall field verify all dimensions and elevations and shall notify ENGINEER of any specific design differences.
- C. Mounting of Slide Gates - See the Contract Drawings for special mounting details.

- D. The slide gate equipment and appurtenances shall be installed in accordance with the installation manual furnished by the gate manufacturer.
  - 1. Extreme care should be used in the handling, storage, and installation of this equipment to prevent damage or distortion to the equipment and to ensure proper performance.
- E. All necessary attaching bolts and anchor bolts shall be ASTM A276 Type 316 stainless steel and shall be furnished by the slide gate manufacturer.

### 3.02 PAINTING

- A. Painting, including surface preparation and maintenance of shop coat and field painting, shall be in full accordance with Section 09900.
  - 1. The equipment manufacturer shall coordinate fully with the CONTRACTOR as to the system and application of paints used.
- B. Enclosed machined or bearing surfaces shall be coated with a water-resistant grease.

### 3.03 EQUIPMENT TESTING

- A. Shop Tests:
  - 1. The completely assembled slide gate, in the vertical position, shall be shop inspected for proper seating.
    - a. The ENGINEER shall be notified 10 days in advance of this shop inspection so that he may witness the shop inspection, if desired.
    - c. The gate disc shall be fully opened and closed in its guide system to ensure that it operates freely and that the required clearance between the disc tongue and gate guide groove maintained at all times.
- B. Field Tests - shall be conducted on all gates to verify compliance with all seating tolerances and leakage requirements.
  - 1. After CONTRACTOR and ENGINEER have mutually agreed that the equipment installation is complete and ready for continuous operation, CONTRACTOR and a qualified field service representative of the manufacturer shall conduct a functional field test and a leakage test of each slide gate in the presence of ENGINEER to demonstrate that each slide gate furnished will function correctly and that maximum permissible leakage is not exceeded.
    - a. Functional Tests:
      - i. Each slide gate with appurtenances shall be field-tested. Tests shall demonstrate to ENGINEER that each part and all parts together function in the manner intended. All necessary testing equipment and manpower shall be provided by CONTRACTOR at their expense. OWNER will furnish all power, and incidental material and labor required for the tests.
    - b. Leakage Tests:
      - i. Maximum permissible leakage shall be in accordance with the requirements above. Excess leakage shall be reduced to meet specified requirements by adjusting the gate, or replacement will be required.
    - c. In the event that the manufacturer is unable to demonstrate to ENGINEER that their equipment meets the requirements of the tests, the deficient equipment will be rejected and CONTRACTOR shall adjust and/or modify and retest the equipment as often as necessary to meet the specified requirements. No separate payments shall be made for adjustments and/or modifications.

### 3.04 SERVICE OF MANUFACTURER'S REPRESENTATIVE

- A. The CONTRACTOR shall arrange for the equipment manufacturer to furnish the services of a qualified representative in accordance with Section 01620.
1. Unless stated otherwise, the representative shall supervise and check the installation(s) for not less than one day, and to perform the final acceptance tests and instruct the OWNER's operators in the operation, proper maintenance and repairs for not less than two additional days.
- B. A written report covering the representative's findings and installation approval shall be mailed directly to the ENGINEER covering all inspections and outlining in detail any deficiencies noted.

### 3.05 EQUIPMENT SCHEDULE

- A. All equipment furnished under this section shall be in accordance with the slide gate schedule below.

#### SLIDE GATE SCHEDULE

Gate No.	Location	Type	Gate Material	Mounting	Operator	Channel Width (inches)	Opening Depth (inches)	Required Gate Depth (inches)
S-1	Distribution box	Non-self-contained with flush bottom seal	Aluminum	See Contract Drawings, S005	Handwheel	18	18	26
S-2	Distribution box	Non-self-contained with flush bottom seal	Aluminum	See Contract Drawings, S005	Handwheel	18	18	26

END OF SECTION

SECTION 11300  
PUMPING EQUIPMENT-GENERAL

PART 1      GENERAL

1.01      SECTION INCLUDES

- A.    Gauges on suction and discharge sides of pump.
- B.    Gauges for pump waterseal connections.
- C.    Nameplate requirements.
- D.    Pressure switches.
- E.    Shop and field tests.
- F.    Services of manufacturer's representative.

1.02      RELATED SECTIONS

- A.    Section 01340 - SUBMITTAL AND CORRESPONDENCE PROCEDURE.
- B.    Section 01620 - EQUIPMENT-GENERAL.
- C.    Section 01650 - STARTING OF SYSTEMS.
- D.    Section 09900 - PAINTING.
- E.    Section 11305 - HORIZONTAL CENTRIFUGAL SOLIDS PUMPS.
- F.    Section 11320 - THICKENED SLUDGE PUMPS.
- G.    Section 11325 - DEWATERING PUMP.
- H.    Section 11333 - POLYMER FEED SYSTEM.

1.03      SUBMITTALS

- A.    Shop Drawings
  - 1.      Submit in accordance with Section 01330.

PART 2      PRODUCTS

2.01      GAUGES

- A.    Gauges shall be installed on the suction and discharge sides of pumps in accordance with the following specifications.
  - 1.      Gauges shall be of the bourdon tube type with 4-1/2-inch diameter dial and with diaphragm seal.

2. Case and ring shall be black epoxy coated aluminum, bourdon tube shall be phosphor bronze with a brass tip and window shall be glass.
  3. Gauges shall be stem mounted and shall be installed close to the suction and discharge flanges of the pump.
  4. Gauges shall be calibrated to read zero at atmospheric pressure.
  5. The suction gauges shall be of the compound type to indicate both pressure and vacuum; they shall be calibrated to read 25 feet of water above and below zero.
  6. The discharge gauges shall be calibrated to read from 0 feet to a minimum of 5 feet of water pressure above pump shutoff head.
  7. Gauges shall be Ashcroft No. 1379A (discharge) and No. 1379AC (suction), U.S. Gauge, or equal.
  8. All gauges shall have continuous duty, clamped Teflon diaphragm seals as manufactured by Ashcroft, Type 300, U.S. Gauge, or equal.
  9. Each diaphragm seal shall have Type 316 stainless steel upper and lower housings.
  10. The lower housing shall be a threaded connection.
  11. Gauges and diaphragm seals shall be by same manufacturer and shall be shipped as complete units, factory filled with silicone fluid.
  12. Each gauge and diaphragm seal unit shall be connected with the necessary brass pipe fittings and a brass stopcock.
  13. The Contractor shall coordinate with the various pump manufacturers so that all gauges are of one manufacturer.
  14. No gauges shall be required on sump or polymer feed.
- B. Gauges shall be installed on pump waterseal connections as shown on the Drawings and in accordance with the following specifications.
1. Gauges shall be of the bourdon tube type with 2-1/2-inch diameter dial.
  2. Case and ring shall be polished stainless steel, bourdon tube shall be phosphor bronze with a brass tip, and the window shall be glass.
  3. Gauges shall be stem mounted in an upright position.
  4. Gauges shall be calibrated to read zero at atmospheric pressure. Gauges shall be calibrated to read from 0 feet to a minimum of 5 feet of water pressure above pump shut-off head.
  5. The gauges shall be connected with brass pipe fittings and stopcocks.
  6. Gauges shall be Ashcroft No. 1009A, U.S. Gauge, or equal.

## 2.02 NAMEPLATES

- A. A brass or stainless steel nameplate shall be furnished for each pump with stamped characters readable under ordinary lighting conditions.
  - 1. Pump nameplate shall give the rating in gallons per minute, rated head, speed and efficiency.
  - 2. Additional data may be in accordance with the manufacturer's regular practice.
  - 3. Nameplates shall be securely attached and NOT PAINTED OVER.

## 2.03 PRESSURE SWITCHES

- A. The Contractor shall coordinate to ensure that all pressure switches supplied for this project shall be by the same manufacturer.
  - 1. Pressure switches supplied for pump discharges 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 Drawings.
  - 2. All other pressure switches shall be located as specified or as recommended by equipment manufacturers.
- B. Unless otherwise specified, pressure switches shall be snap action, automatic reset, 120 volt, heavy duty a-c switches and shall be adjustable over the normal operating range specified or as recommended by equipment manufacturers.
  - 1. Pressure switches to be installed in hazardous areas shall be NEMA 7 and all others shall be NEMA 4.
  - 2. All pressure switches shall have normally open contacts, which close when the switch is activated.
  - 3. High pressure switches and pressure switches on pump discharges shall activate on pressure increase and shall be wired by the CONTRACTOR to deactivate the corresponding pump or equipment when the preset pressure setting is exceeded.
  - 4. Low pressure switches and pressure switches on pump intakes shall activate on pressure decrease and shall be wired by the CONTRACTOR to deactivate the corresponding pump or equipment when the pressure drops below the preset pressure or vacuum setting.
  - 5. The pressure switches shall be manufactured by Ashcroft, Automatic Switch Company, or equal.
  - 6. The Contractor and equipment manufacturer shall coordinate the installation and operating range of pressure switches.
- C. Each pressure switch shall have a continuous duty, clamped Teflon diaphragm seal as manufactured by Ashcroft, Type 300, U.S. Gauge, or equal.
  - 1. Each diaphragm seal shall have Type 316 stainless steel upper and lower housings.
  - 2. The lower housing shall have a threaded connection.
  - 3. Switches and diaphragm seals shall be by the same manufacturer and shall be shipped as a complete unit, factory filled with silicone fluid.

4. Each switch and diaphragm seal unit shall be connected with the necessary brass pipe fittings and a stopcock.

#### 2.04 SHOP TESTS

- A. Tests shall be performed on the pumps in accordance with Section 01620.
  1. Each pump unit shall be shop tested to determine compliance with the specifications, and the manufacturers shall submit to the Engineer and receive approval of five certified copies of test data before shipment of the pumps is made.
  2. The Engineer reserves the right to witness the shop test on each pump before the pumps are assembled for shipment to the job site.
  3. The pump manufacturer shall give the Engineer ample notice of these tests so that the Engineer can arrange to witness the tests.
  4. Final acceptance, however, will be dependent upon the satisfactory operation and performance after installation.

### PART 3 EXECUTION

#### 3.01 PAINTING

- A. Painting, including surface preparation, shall be in full accordance with Section 09900.
  1. The pump manufacturer shall coordinate fully with the Contractor the system and application of paints used.

#### 3.02 INSTALLATION OF EQUIPMENT

- A. Pumping equipment shall be installed by the Contractor in accordance with Section 01620.

#### 3.03 FIELD TESTS

- A. Field tests shall be made in conformance with Section 01620.
- B. Preliminary field tests shall be made after installation of the pumps. Final field tests shall demonstrate the following:
  1. That the units have been properly installed and are in proper alignment.
  2. That the units operate without overheating or overloading of any parts and without objectionable vibration.
  3. That there are no mechanical defects in any of the parts.
  4. That the pumps can deliver the specified pressure and quantity at the rated speed. All field tests shall be conducted with clean water from the public water supply system. The Contractor shall provide all temporary flow measurement devices as necessary to achieve accurate measurement of the pumped flow during the field tests.
  5. That the pumps can pass the size of solids specified and the type of liquid for which the pumps are to be used.



### 3.04 SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. Unless stated otherwise in the individual equipment section, the Contractor shall arrange for the equipment manufacturer to furnish the services of a qualified representative in accordance with Section 01620.
  - 1. For each series of pumps of the same model and size, the representative shall supervise and check the installation for not less than two days and supervise its initial operation, instruct the operators in operation, proper maintenance and repairs for not less than one day or for a length of time defined in the individual equipment section.

END OF SECTION

## SECTION 11305

### HORIZONTAL CENTRIFUGAL SOLIDS HANDLING PUMPS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Scope
  - 1. Furnish and install, complete and ready to operate two horizontal, single stage, end suction, centrifugal pumps, including motor, baseplate, couplings, coupling guards, accessories, control panels/drives, spare parts, and manufacturer's services, in accordance with the following specifications and as shown on the Contract Drawings.
  - 2. Pumps shall replace existing Coagulation Basin Blowdown Pumps in Building B.
  - 3. Provide all fittings required for connection of the pumps to the piping shown on the Contract Drawings.

##### 1.02 RELATED SECTIONS

- A. Section 01331 - SHOP DRAWING PROCEDURES.
- B. Section 01620 - EQUIPMENT-GENERAL.
- C. Section 01640 - TRANSPORTATION AND HANDLING OF EQUIPMENT AND MATERIALS.
- 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.
- I. Section 09900 - PAINTING.
- J. Section 11300 - PUMPING EQUIPMENT-GENERAL.
- K. Section 15060 - INSIDE PROCESS PIPING.
- L. Section 15100 - VALVES AND APPURTENANCES.
- M. Section 15170 - MOTORS.
- N. All Division 16 Sections.
- O. All Division 17 Sections.

### 1.03 REFERENCE STANDARDS

ANSI/HI 1.1-1.6	Centrifugal Pumps
ANSI/HI 9.1-9.5	Pumps – General Guidelines
ANSI/HI 9.6.1	Centrifugal and Vertical Pumps for NSPH Margin
ANSI/HI 9.6.3	Centrifugal and Vertical Pumps Allowable Operating Range
ANSI/HI 9.6.4	Centrifugal and Vertical Pumps. Vibration Measurements and Allowable Values
ASTM A48	Specification for Gray-Iron Castings
ASTM A108	Specification for Steel Bars, Carbon, Cold Finished, Standard Quality
ASTM A532	Specification for Abrasion-Resistant Cast Iron
ASTM A582	Specification for Free-Machining Stainless and Heat-Resisting Steel Bars
ANSI	American National Standards Institute
AFBMA Std. 11	Load and Fatigue Life for Roller Bearings

### 1.04 DESIGN AND PERFORMANCE REQUIREMENTS

- A. The pump(s) shall be designed for and operated continuously under normal service under the following operating conditions:

Primary Design Point	
Pumping rate	150 gpm
Pumping head	50 feet
Efficiency (minimum)	45%
Maximum NPSHR	13.7 ft.
Maximum Pump speed	1750 rpm
Maximum power	5 HP
Minimum Pump shutoff head	42 feet
Maximum sphere size	2 inches
Pump suction/discharge size	2 inches/2 inches

- B. The pumps shall be specifically designed to optimize wear resistance and maintain hydraulic performance as wear occurs in connection with pumping of abrasive grit and other solids.
- C. Vibration, when measured at the pump bearing housing shall not exceed the limitations specified by the Hydraulic Institute of Standards.

### 1.05 SUBMITTALS

- A. Shop Drawings
- Submit shop drawings for equipment provided under this section. Format and content of the shop drawing submittal shall conform to the requirements specified in Sections 01331 and 01620.
  - The shop drawing submittal shall include the following as a minimum:
    - Manufacturer's performance affidavit conforming to the requirements specified in Section 01331.
    - Submit operation and maintenance instructions according to Section 01781.
    - Manufacturer's published pump curves demonstrating compliance with specified performance requirements.
    - Manufacturer's catalog information, descriptive literature, specifications, etc. for pumps, motors, and accessories, including pump seal assemblies.
    - Manufacturer's certified installation drawings containing all critical dimensions, piping connection sizes, weights, etc. required for installation of the equipment.
    - Shop and field painting information.
    - Motor information conforming to the requirements specified in Section 15170.
    - Manufacturer's written installation instructions, including any special requirements for shipping, handling, and storage of equipment prior to installation.

- B. Shop Test Results - Submit shop test results, including certified pump curves for each pump provided, in accordance with the requirements of Sections 01331 and 11300.
- C. Manufacturer's Operation and Maintenance Instructions
  - 1. Submit manufacturer's written instructions for proper operation and maintenance of pumps, motors, and accessories provided under this section.
  - 2. Format and content of the manufacturer's operation and maintenance instructions shall conform to the requirements specified in Section 01781.
- D. Manufacturer's Certification
  - 1. Submit written certification of proper equipment installation and satisfactory completion of preliminary field testing by authorized field service representative of the equipment manufacturer.
  - 2. Manufacturer's certification shall conform to the requirements specified in Sections 01620 and 11300.

#### 1.06 QUALITY ASSURANCE

- A. All pumping equipment furnished under this Section shall be of a design and manufacture that has been used in similar applications and it shall be demonstrated to the satisfaction of the OWNER that the quality is equal to equipment made by that manufacturer specifically named herein.
- B. Unit responsibility. Pumps, complete with motor, base, coupling, necessary guards and all other specified accessories and appurtenances shall be furnished by the pump manufacturer to insure compatibility and integrity of the individual components, and provide the specified warranty for all components.
- C. The horizontal dry-pit solids-handling pumps specified in this section shall be furnished by and be the product of one manufacturer.
- D. Pumps shall be engineered and manufactured under a written Quality Assurance program. The Quality Assurance program is to be in effect for at least ten years, to include a written record of periodic internal and external audits to confirm compliance with such program.
- E. Pumps shall be manufactured under the certification of ISO-9001:2000

#### 1.07 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.

#### 1.08 SPARE PARTS

- A. Furnish the following spare parts in clearly identified containers:
  - 1. Four (4) sets of gaskets and O-rings.
  - 2. Four (4) sets of all ball bearings.
  - 3. Four (4) sets of lip seals.
  - 4. Four (4) sets of wear plates.

## 1.09 WARRANTY

- A. Provide equipment warranty in accordance with the General Conditions, Supplementary Conditions, and Section 01620.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. The pumping equipment manufacturer shall be the following or approved equal:
  - 1. Goulds Pump, HS 2HM 2x2x8.
- B. Manufacturer shall have installations of like or similar application with a minimum of 40 years' service for this pump size.

### 2.02 PUMP DESIGN

- A. Impeller
  - 1. The impeller shall be single-suction enclosed type with two vanes, made of Ductile Iron. Impeller shall be specifically designed with smooth water passages to prevent clogging by stringy or fibrous materials, and shall be capable of passing solids having a maximum sphere size of 2.0 inches.
  - 2. The impeller shall be dynamically balanced and shall be keyed and secured to the shaft by a 18-8 stainless steel nut locked in place. It shall be readily removed without the use of special tools.
- B. Volute Casing
  - 1. The Casing shall be close-grained cast iron conforming to ASTM A48 Class 30 of sufficient strength, weight and metal thickness to insure long life, accurate alignment, and reliable operation. The volute shall have smooth fluid passages large enough at all points to pass any size solid which can pass through the impeller and provide smooth unobstructed flow.
  - 2. The volute shall be flanged tangential discharge and capable of rotation in 45 degree increments to accommodate piping orientation.
  - 3. Casing shall be split perpendicular to the shaft, with removable suction cover and stuffing box cover. Machined fit for these parts shall be accurately aligned and identical so that casing may be installed for either clockwise or counterclockwise direction of rotation.
  - 4. The volute shall be furnished with large cleanout openings located at the impeller centerline, to allow access to the impeller. Volute priming, drain and ½" minimum gauge connections shall be provided. Flanges shall be 125 lbs. flat faced flanges per ANSI drilling and slotted for ease of assembly and disassembly.
  - 5. The casing shall be designed to permit the removal of the rotating assembly without disturbing the suction or discharge piping. The casing shall be hydrostatically tested to 1.5 times the design head or 1.25 times the shutoff head whichever is greater.
- C. Wear Rings
  - 1. Wear rings shall be provided on both the impeller and suction cover so that clearances can be maintained throughout the life of the rings and minimize recirculation.
  - 2. Impeller wear rings shall be replaceable 11.5-14% chrome steel "L" shaped axial or face-type and mounted on impeller to provide a renewable surface opposite the suction cover wear plate.
  - 3. Suction cover wear rings shall be replaceable 11.5-14% chrome steel and provide a minimum of ¼ inch wear surface. It shall be installed with its wear surface parallel to the end of the impeller nut.
  - 4. Wear rings shall be attached to the impeller and suction cover using an interference fit and loctite.
  - 5. Wear ring clearance adjustment shall have provisions for adjustment of axial clearance. This adjustment shall be made through the use of shims placed between the frame and outboard bearing housing.

D. Suction Cover

1. The Suction Cover shall be removable to allow access to the impeller. It shall be ASTM A48 Class 30 Cast Iron and drilled for ANSI 125 lb. flanges. The mounting holes shall be slotted for ease of assembly and disassembly.
2. Suction gauge connections shall be drilled & tapped next to the suction flange to accommodate a ¼ inch IPS pipe fitting.

E. Stuffing Box Cover

1. Stuffing box cover shall be made of ASTM A48 Class 30 close-grained cast iron with integral stuffing box and shall be designed to accept a dynamic seal.
2. Dynamic seal: stuffing box shall be fitted with a single stage, Dynamic Seal capable of balancing positive suction heads.
  - a. Throttle Bushing: a throttle bushing and sleeve shall be placed in the stuff box cover. Both pieces shall be made of 316 stainless steel with a NI-CR-Boron coating to a hardness of 58-63 RC (approximately 650 BHN).
  - b. The Dynamic Seal expeller shall be made of nodular iron, ASTM 536 or 304 stainless steel. A pressure relief connection with elbow, fittings, and tubing shall be provided in the seal cover to bleed liquid back to the suction cover of the pump.
  - c. Static Seal: Dual static seals, provided with the grease cavity between them, shall be installed in the seal cover to prevent leakage along the shaft, when the pump is not running. A positive means for adding grease shall be provided in the seal cover. Seals shall contact a 316 stainless steel sleeve with a Ni-Cr-Boron coating to a hardness of 58-63 RC (approximately 650 BHN). Equiseal® Dynamic Seal shall be manufactured by Xylem Flygt or approved equal.

F. Shaft

1. Pump Shaft: the pump shaft shall be high-strength carbon steel, AISI #4140 minimum, accurately machined, tapered at the impeller end and sufficiently sized to transmit full driver output. 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.

G. Bearing Frame Assembly

1. The Bearing housing shall be one-piece rigid cast iron construction. Frame shall be provided with cast iron bearing housing at the outboard end, and a cast iron end cover at the inboard end. Both ends of the frame shall be provided with lip type grease seals and labyrinth type deflectors to prevent the entrance of contaminants.
2. Frame shall be provided with a ¾ inch IPS pipe tapped hole, located as low as possible to drain the leakage from the packing gland.
3. Jacking bolts for external impeller adjustments are required.
4. Zerk-type grease fittings for bearing lubrication shall be supplied at the bearing housing.
5. Pump shall be frame mounted to the base with fabricated steel pump supporting feet.
6. Inboard bearing – inboard bearings shall be single row, radial type suitable for all loads encountered in the service conditions.
7. Outboard bearing – outboard bearings shall be axial thrust, angular contact, double row ball suitable for thrust loads in two directions.
8. Bearings shall be designed for an L10 life of 100,000 hours per AFBMA at best efficiency point.
9. Bearing Lubrication: bearings shall be grease lubricated with provisions for the addition and relief of grease.
10. Bearing Locking: the outboard bearing shall be locked to the shaft with a nut and lock washer. The lock washer shall have a key seat tab on its ID to prevent it from turning and a set of tabs on its OD, one of which will align with a notch in the nut to prevent it from loosening.

- H. Baseplate
  - 1. Baseplate shall be fabricated steel drip lip type, sufficiently rigid to support pump and motor in proper alignment. Two ½ inch tapped holes shall be provided a one end for draining. A lifting device shall be provided at both ends of the baseplate.
- I. Coupling and Coupling Guard
  - 1. Couplings: the couplings shall be of flexible type.
  - 2. Coupling Hubs: coupling hubs shall be secured to the driver and driven shafts by a set screw located over the key.
  - 3. Coupling Guard: Guard shall be all-metal completely enclosing the coupling.
- J. Fits and Hardware
  - 1. The volute/casing, suction cover, stuffing box cover, and frame shall be manufactured with concentric shoulder fits to assure accurate alignment. All machined bolts, nuts, and cap screws shall be of the hex-head type and will not require the use of any special tools.
- K. Vibration Limitations (Field)
  - 1. The limits of vibration as set forth in the standards of the Hydraulic Institute shall govern.

## 2.03 MOTORS

- A. Each pump shall be provided with a 5 HP, 1750 rpm, TEFC motor having a service factor rating of 1.15. Motor shall be suitable for 230/460VAC, 3-phase, 60 hertz AC power supply.
- B. Motors shall conform to requirements specified in Section 15170.
- C. Pump shall be furnished with explosion proof motor winding thermal protectors.
- D. Pump operation shall terminate due to high motor winding temperature and fail conditions. Should either event occur, the motor starter shall drop out and the fail indicating light, visible on the control panel, shall indicate the equipment has shut down. The equipment shall remain locked out until manually reset. Indicating light shall be a push-to-reset type as specified in Division 16 specifications.
- E. Drives: The manufacturer of the pumps and motors shall provide a certification letter indicating that the motors will operate within the ranges specified and are compatible with the variable frequency drives specified in Division 16 specifications.

## 2.05 CONTROL PANEL

- A. Controls shall be as shown on the Electrical Drawings, as specified with Division 16, Electrical Specifications and Division 17, Instrumentation and in full compliance with this section.
- B. Control panel shall be NEMA 4X.

## 2.05 ACCESSORIES

- A. Provide suction and discharge pressure gauges for each pump. Pressure gauges shall conform to the requirements specified in Section 11300.
- C. Provide nameplates for each pump. Nameplates shall conform to the requirements specified in Section 11300.

## 2.06 FINISHES

- A. Surface preparation, shop painting and field painting of equipment provided under this section shall conform to the requirements specified in Section 09900.

## 2.07 SHOP TESTS

- A. Each pump shall undergo a certified hydrostatic test at 150 percent of the pressure developed at shutoff head. During the test the casing shall show no undue deflection, nor shall the casing of the pump show signs of sweating through the metal or leakage at the gaskets or development of cracks.
- B. A certified performance test shall be performed on each unit utilizing its specified drive.
- C. All tests shall be performed in accordance with the Hydraulic Institute of Test Standards for Centrifugal Pumps.
- D. Test points at 100%, 90%, 80%, 70%, and 60% speeds shall be taken. The CONTRACTOR shall submit five copies of the certified test reports to the ENGINEER. Results of the performance tests shall be certified by a registered professional ENGINEER and submitted for approval before final shipment.
- E. Before final shipment, a Brinell hardness test shall be conducted showing compliance with ASTM A532 and shall be submitted for approval. Each individual casting shall be Brinell tested at the manufacturer's plant to ASTM Method E-10. Each casting shall be checked in a minimum of two places, in an area that is representative of the casting thickness. Results of the Brinell tests shall be certified by a registered professional ENGINEER and submitted for approval prior to shipment

## PART 3 EXECUTION

### 3.01 EQUIPMENT INSTALLATION

- A. Install equipment provided under this section in accordance with the manufacturer's installation instructions and as shown on the Contract Drawings.
- B. Field verify all dimensions and elevations and notify ENGINEER of any specific differences.
- C. Furnish and install all necessary lubricants required for startup, testing and initial operation of the equipment.

### 3.02 EQUIPMENT STARTUP, TESTING AND INITIAL OPERATION

- A. Perform startup, testing and initial operation of equipment provided under this section in accordance with the manufacturer's instructions and the requirements specified in Sections 01620, 01751, and 11300.
- B. All testing shall be conducted in the presence of the ENGINEER and the equipment manufacturer or their approved representative.
- C. Final acceptance of the equipment will be made after each pump has been demonstrated in the field to meet the following:
  - 1. The equipment can meet the specified performance requirements under all normal operating conditions and the motors are not overloaded in normal operating conditions.
  - 2. The pump casing, motor, and base plate shall be checked for abnormal noise and vibration while the pump is running throughout the normal range of motor speeds. Abnormal noise or excessive vibration shall constitute failure of pump.
- D. Adjust, repair, modify, or replace any components of the system, which fail to meet all specified requirements.



3.03      MANUFACTURERS' FIELD SERVICES

- A.    The services of an authorized representative of the equipment manufacturer shall be provided in accordance with the requirements specified in Section 01620.

END OF SECTION

## SECTION 11315

### TEMPORARY RESIDUALS DEWATERING AND DISPOSAL

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Furnish and install temporary pumping and dewatering system to convey and dewater all dilute sludge produced at the WTP during the construction of the Building E upgrades.
- B. Residuals hauling and off-site disposal.

##### 1.02 RELATED SECTIONS

- A. Section 01010 - SUMMARY OF WORK.
- B. Section 01131 - SCHEDULE OF COMPLETION.
- C. Section 01331- COORDINATION WITH OWNER'S OPERATIONS.
- D. Section 01540 - TEMPORARY PUMPING.

##### 1.03 SYSTEM DESCRIPTION

- A. During the construction of the Residuals Handling Upgrades to the Erie County Water Authority's Van De Water Water Treatment Plant, the following equipment in Building E may be taken offline to facilitate construction of the proposed upgrades:
  - a. Existing Distribution Box and mixer
  - b. Existing Sludge Thickener No. 2
  - c. Existing Sludge Decant Tank
  - d. Thickened Sludge Pumps
  - e. Reaction Mixer Tank
  - f. Conditioned Sludge Pumps
  - g. Conditioned Sludge Retention Tank
  - h. Pressure Filter Press Feed Pumps
  - i. Precoat Storage Tank, Precoat Tank, and Precoat Pumps
  - j. Pressure Filter (a/k/a "Plate and Frame Filter Press")
  - k. Sludge Bunker and Bunker Conveyor
  - l. Sludge Elevating Conveyor
  - m. Equalizing Tank
  - n. Filtrate and Decant Storage Well
  - o. Filtrate Transfer Pumps
- B. Prior to taking equipment in Building E offline, CONTRACTOR shall furnish and install a temporary residuals dewatering system. Temporary dewatering system (including feed pump) shall be operational and shown to operate successfully for a period of two (2) consecutive weeks prior to taking any equipment offline in Building E.
- C. Refer to site plans for location of temporary dewatering system.
- D. Subject to the provisions of Section 01540, CONTRACTOR shall provide and operate a temporary feed pump (with fully redundant standby pump) to the dewatering system. CONTRACTOR shall connect to existing blind flange on 8-inch diameter suction header in the Dilute Sludge Pump Chamber (commonly

referred to as the “Sludge Bunker”). CONTRACTOR shall provide a temporary pump, capable of delivering up to 120 gpm of dilute sludge to the temporary dewatering system. Provide temporary 6-inch diameter HDPE discharge piping from the temporary pump at the Dilute Sludge Pump Chamber, to the temporary dewatering system. Provide heat tracing and insulation on exposed piping.

- E. Provide cleanouts in temporary discharge piping to regularly flush the line. Contractor shall be responsible to ensure the line does not plug during normal operations.
- F. Coordinate with OWNER’S staff for operation of temporary pump, as needed to maintain the proper operating level at the Sludge Holding Tank. Operation of the pump shall normally be during working hours (i.e., 7:00 AM to 5:00 PM), however from time to time the CONTRATOR may be required to run the pump and temporary dewatering equipment off-hours to accommodate Owner’s operation of the WTP. CONTRACTOR shall anticipate running the temporary pump up to 8 hours per day to maintain the proper levels in the Sludge Holding Tank.
  - a. The sludge holding tank is 40-feet in diameter
  - b. Bottom of tank elevation is 578.00
  - c. Minimum sludge level in tank is 588.00 (10-feet above tank bottom)
  - d. Maximum sludge level in tank is 593.00 (15-feet above tank bottom).
- G. The CONTRACTOR is responsible for the conveyance, dewatering and disposal of residuals treated on-site. The CONTRACTOR is responsible to provide a temporary belt filter press to operate during normal working hours, in accordance with the schedule outlined in Section 01131. The CONTRACTOR is responsible for choosing the size of the temporary belt filter press equipment necessary to accommodate the following conditions:
  - a. Average Feed Rate: 60 gpm
  - b. Maximum Feed Rate: 120 gpm
  - c. Minimum Dilute Sludge Solids Concentration: 0.8%
  - d. Average Dilute Sludge Solids Concentration: 1.5%
  - e. Maximum Dilute Sludge Solids Concentration: 2.5%
- H. Pressate water shall comply with the discharge limits stipulated in the OWNER’S SPDES Permit; NYSDEC No. NY-0033987:
  - a. TSS (mg/L): 20/40 on a 7/30 day average basis
  - b. Settleable Solids (mL/L): 0.1
  - c. Total Chlorine Residual (mg/L): 0.1
  - d. pH: 6.5 – 8.5
  - e. Fluoride (mg/L): 15
  - f. Aluminum (mg/L): 4.0
  - g. Manganese (mg/L): 3.0
- I. CONTRACTOR shall provide a temporary enclosure and heating equipment to maintain a minimum ambient temperature of 50 degrees F when outside temperature is -10 degrees F.
- J. Connect to existing MCC in Building E and provide temporary feed to dewatering system. Refer to Electrical Drawings. Temporary power shall be limited to 150A, including dewatering system and temporary heat. Temporary centrifuge systems will only be considered if total power demand is less than 150A (including heat).
- K. The CONTRATOR shall have a replacement temporary press made available within 24-hours’ notice in the event of a failure of the provided belt filter press.

L. CONTRACTOR shall submit a diagram illustrating the layout of the temporary system, including:

- a. Temporary pump discharge piping configuration
- b. Configuration of the temporary dewatering unit
- c. Temporary enclosure and heating system
- d. Water connection
- e. Pressate drain
- f. Electrical connections
- g. Means to convey dewatered sludge to a dumpster, and proposed dumpster layout

#### 1.04 CONTRACTOR REQUIREMENTS

- A. CONTRACTOR and CONTRACTOR staff shall have a minimum of five years of experience in residuals handling equipment operation, and providing and operating temporary, mobile, sludge dewatering systems. Furnish a typewritten list of jobs completed of this nature in the past five years with equipment submittal. Listing the name and address of the job, date of start and completion, a brief description and cost of the project, name and current phone number of project Owner's representative familiar with your performance.
- B. The CONTRACTOR shall provide all temporary connections and piping required to properly operate the belt filter press and convey sludge, filtrate, and wash water to and from the temporary belt filter press at locations identified on the Contract Drawings.
- C. CONTRACTOR shall connect to existing water supply and provide a backflow preventer at the connection to the temporary wash water connection.
- D. CONTRACTOR shall convey pressate to the catch basin shown on the drawings.

#### 1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable local, state and federal regulations for legal hauling and disposal of residuals contents.
- B. Obtain necessary permits including those required by New York State Department of Environmental Conservation (NYSDEC) for legal hauling and disposal of materials removed from residuals.
- C. Dispose of residuals contents in a location and in a manner approved by NYSDEC and any other associated regulatory groups.

### PART 2 PRODUCTS - NOT USED

### PART 3 EXECUTION

#### 3.01 GENERAL

- A. All required submittals identified in Section 01331 and as required by individual specification sections shall be approved before work onsite begins.
- B. All necessary temporary equipment, related appurtenances, and utilities shall be mobilized, erected and tested prior to beginning operations.
- C. Furnish all labor, materials, tools and equipment necessary to perform specified work. Existing pumping, piping, mixing and other associated Owner equipment is not available for use by contractor to perform required work.

- D. Repair any damage caused by contractor operations.
- E. Material which is dewatered must be disposed of on a regular basis. Material may not be stored at the site for more than 48-hours. Provide tarps to cover dumpsters when dewatering equipment is not online. .
- F. Provide qualified and experienced personnel to mobilize/demobilize operate and maintain all of the required equipment and process utilized to accomplish the work
- G. Provide all hoses, fittings and or connectors, polymer, spare parts, any and all equipment or accessories required for any temporary operating equipment.
- H. Provide the Owner with safe and adequate means to observe all operations, take samples, and perform daily data recording.

### 3.04 SOLIDS DEWATERING, HAULING AND OFF-SITE DISPOSAL

- A. Identify and make arrangements for a primary and secondary off-site disposal facility for dewatered residuals contents. The Contractor is responsible for all costs associated with the disposal of dewater residuals.
- B. Provide, erect within contract limits, and operate temporary solids dewatering, treatment and handling facilities necessary to meet requirements of selected primary and secondary off-site disposal facilities. Temporary dewatering system shall be of sufficient size and capability to dewatering an average loading rate as outlined in Article 1.03. Dewatering equipment shall be designed and operated to achieve a minimum of 90 percent solids capture through the temporary dewatering equipment, and a minimum dewatered solids content by weight of 25 percent.
  - a. If in the opinion of the Owner, dewatering equipment is not consistently achieving solids capture of at least 90 percent, the Owner will direct that the dewatering operations be suspended until necessary adjustments in equipment or operation have been made and 90 percent capture is demonstrated. Any delay incurred as a result of minimum solids capture not being maintained, shall be contractor's responsibility.
- C. Provide all accessories including polymers for dewatering, chemicals for odor control, and backflow preventer on wash water lines.
- D. Provide power outlets, distribution equipment, branch wiring, and all accessories necessary (including heat tracing). Provide all necessary transformers, breakers, conductors and distribution.
- E. Collect in the presence of the Owner, and have analyzed for percent solids by weight, two samples of dewatered residual contents per 10 wet tons of dewatered material produced. Submit results to OWNER. Weight quantity of dewatered material produced and record. Submit record to OWNER. The quantity of dry solids for which payment will be based will be the average of the dewatered solids concentration test results times the total wet weight of dewatered solids produced to result in a total dry weight of solids dewatered, hauled and disposed off site.
- F. Provide, maintain and operate appropriate apparatus to load and transport dewatered residuals contents to the selected disposal facility. Loaded transportation vehicles shall not be stored onsite. Once loaded, vehicles shall be covered and removed from the site. Roll-off containers/dumpsters shall be provided by the CONTRACTOR.
- G. Coordinate operations with disposal facility hours of operation.

- H. Payment for all work in this Section shall be on a unit price basis per dry tons of residuals disposed. Refer to Section 01270, "Measurement and Payment."

END OF SECTION

## SECTION 11320

### THICKENED SLUDGE PUMPS

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

###### A. Scope

1. CONTRACTOR shall provide all labor, materials, services, equipment and incidentals as shown, specified and required to furnish and install Thickened Sludge Pumps TSP-1 and TSP-2, complete and operational.
2. The manufacturer of the pumps included in this specification section shall have responsibility for performance and compatibility of the supplied system, including motors and drives.
3. Pumps shall be used for pumping thickened sludge from two Thickener-Clarifiers to two Belt Filter Presses. Equipment locations are as shown on the Contract Drawings.

###### B. Related Sections

1. Section 01331 - SHOP DRAWING PROCEDURES.
2. Section 01620 - EQUIPMENT-GENERAL.
3. Section 01640 - TRANSPORTATION AND HANDLING OF EQUIPMENT AND MATERIALS.
4. Section 01660 - STORAGE OF MATERIAL.
5. Section 01730 - INSTALLATION DATA.
6. Section 01731 - CONNECTIONS TO EXISTING FACILITIES.
7. Section 01751 - STARTING AND PLACING EQUIPMENT IN OPERATION.
8. Section 01781 - OPERATION AND MAINTENANCE DATA.
9. Section 05500 - MISCELLANEOUS FABRICATIONS.
10. Section 09900 - PAINTING.
11. Section 11300 - PUMPING EQUIPMENT-GENERAL.
12. Section 11335 - THICKENER-CLARIFIER SLUDGE COLLECTION EQUIPMENT.
13. Section 11350 - BELT FILTER PRESS.
14. Section 15060 - INSIDE PROCESS PIPING.
15. Section 15100 - VALVES AND APPURTENANCES.
16. Section 15170 - MOTORS.
17. All Division 16 Specifications.
18. All Division 17 Specifications.

- C. All electrical equipment and wiring shall be in compliance with Divisions 16 and 17.

##### 1.02 REFERENCE STANDARDS

- A. Standards for the Hydraulic Institute.
- B. American National Standards Institute (ANSI).
- C. American Society for Testing Materials (ASTM).
- D. Institute of Electrical and Electronic Engineers (IEEE).
- E. National Electric Code (NEC).
- F. National Electrical Manufacturers Association (NEMA).
- G. National Sanitation Foundation (NSF).

### 1.03 SUBMITTALS

- A. Submit shop drawings for all equipment furnished under this section in accordance with Section 01331.
- B. Submit operation and maintenance instructions according to Section 01781.
- C. In addition to the requirements within Sections 01331 and 01781, submit the following:
  - 1. Certified shop tests.
  - 2. Data regarding pump and motor characteristic and performance inclusive of guaranteed performance curves showing equipment meets the specified requirements of head, capacity, and horsepower.
  - 3. Certified factory test data showing metering accuracy and repeatability from a minimum of 10 machined hoses of the sizes specified with each hose operating for a minimum of 500 hours each.
  - 4. Provide characteristic curves for variable speed pumps for both actual maximum pump speed and for speed required to obtain minimum pump flow specified. Include any “critical speed” rejections.
  - 5. Shop drawings for all accessory items.
  - 6. Dimensional drawings inclusive of recommended location of anchor bolts.
  - 7. Manufacturer's literature as needed to supplement certified data.
  - 8. Operating and maintenance instruction and parts lists.
  - 9. Certified results of vacuum testing
  - 10. Certified bearing life.
  - 11. Drawings showing schematic control and power wiring connections and interconnections.
  - 12. Recommendations for long and short term storage.
  - 13. Use tag numbers for all equipment as indicated and specified.
  - 14. Recommended location and mounting of pulsation dampening devices.

### 1.04 QUALITY ASSURANCE

- A. All hose pumps shall be the product of one manufacturer.
- B. Pumps shall be manufacturer's standard catalog product.
- C. Pumps shall be assembled in compliance within ISO 9002 standards.
- D. CONTRACTOR shall provide pumps and accessories, which are integral to pump operation, and specified herein as a coordinated package, regardless of manufacturer. This includes pumps, gear reducers, motors, pulsation dampeners, leak detectors, control panels/drives and other such accessories specified under this section as the responsibility of the pump supplier. Equipment specified herein that is not supplied by the pump manufacturer, as an integrated package will be rejected.

### 1.05 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.



## 1.06 SPARE PARTS

- A. Provide spare parts that are identical to and interchangeable with parts installed. Furnish and deliver the following spare parts for each pump:
  - 1. Four replacement hoses.
  - 2. Four hose lubricant refills.
  - 3. Two pulsation dampeners.
  - 4. One hose failure detector.
  - 5. One revolution sensor.
  - 6. One digital panel meter.

## 1.07 WARRANTY

- A. Provide equipment warranty in accordance with the General Conditions, Supplementary Conditions, and Section 01620.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. The pumping equipment manufacturer shall be the following or approved equal:
  - 1. Watson-Marlow/Bredel Pumps.
  - 2. Prominent DulcoFlex DFD pumps

### 2.02 EQUIPMENT DESIGN

- A. Description
  - 1. Pumps shall be peristaltic hose-type complete with appurtenances as indicated and specified.
  - 2. Pumps driven as indicated in Table 11320-1.
  - 3. Design and proportion all parts of pumps for duty specified.
  - 4. Thickened Sludge Pumps TSP-1 and TSP-2 shall be oriented such that the motor side of the pumps are facing each other, as shown on the Contract Drawings.

- B. Performance Criteria - Pumps shall comply with the minimum design conditions specified below and shall be specially designed, constructed, and installed for the service intended:

TABLE 11320-1: PUMP DESIGN CRITERIA

PARAMETER	VALUE
Use	Thickened sludge transfer
Number required	2
Pump flange size (inches)	6
Fluid:	
Type/concentration	Thickened residuals
Specific gravity	1.02
Fluid temperature (°F)	40 to 80
Solid content (total solids, dry weight basis)	0.5 to 6 percent
Capacity (per pump):	
Minimum flow (gpm)	50
Average flow (gpm)	106
Maximum flow (gpm)	150
Maximum pump RPM	28
Suction pressure:	
Maximum positive static head (feet)	11.5
Maximum suction lift (feet)	11
Average discharge pressure (feet)	140
Pump flange size (ASA 150#) (inches)	4
Insert material	316 stainless steel
Motor (RPM)	20
Power requirements (VAC/Phase/Hertz)	460/3/60
Hose material	Natural rubber
Orientation (facing pump)	See Contract Drawings

## 2.03 PUMP CONSTRUCTION

- A. Pump
1. General
    - a. Horizontal, positive displacement, peristaltic hose pump.
    - b. Capable of operating in either direction without flow variation.
    - c. Capable of running dry without damage to pump or hose.
    - d. Capable of pulling 95 percent of full vacuum.
    - e. Repeatability -  $\pm 1$  percent accurate.
    - f. Valveless/glandless design with no dynamic seals in contact with the pumped product.
    - g. Pump shall be capable of being rotated in 90-degree increments for four different port mounting configurations.
    - h. Direct coupled gear drive arrangement as specified herein.

2. Hose and Lubricant
  - a. Hose shall be manufactured of three-layer elastomer with an extruded inner wetted layer compatible with the process fluid, four layers of nylon reinforcement, and a natural rubber outer layer. Hose outside diameter shall be machined to maintain a wall thickness within  $\pm 0.25$  mm tolerance. The hose external surface shall have a surface roughness of  $Ra\ 8 \pm 4\mu$ . Hoses that do not meet these minimum requirements are not acceptable.
  - b. Minimum static burst pressure rating of 800 psi
  - c. 53-68 shore A durometer.
  - d. Hose must be replaceable without cover or pump removal.
  - e. Pump housing shall contain an NSF-listed food-grade glycerin based hose lubricant blended to provide a medium for cooling and lubrication.
  - f. Provide a threaded drain plug at the lowest point of the pumping chamber to allow the complete drainage of lubricant.
3. Pump Housing with Internal Bearing Frame
  - a. Pump housing shall be constructed of cast iron ASTM A48 Class 25 and shall be supplied with an internally mounted bearing hub and rotor assembly. Gear unit shall be direct coupled to the back of the pump housing and shall be completely isolated from the process fluid and pump lubricant through the sealed bearing hub. Gear unit and drive components shall be serviceable without removal of pump rotor.
  - b. Rotor shall be constructed of cast iron ASTM A48 Class 25 with two pressing shoes mounted 180 degrees apart. Shoes shall be constructed of epoxy or extruded aluminum as recommended by the manufacturer and shall be adjustable for varying degrees of compression via flat shims constructed of 316 stainless steel. Rotors incorporating rollers or fixed occlusion shoes are unacceptable.
  - c. Pump rotor shall be independently supported on its own set of 5-inch inside diameter ball bearings such that the bearings are located directly under the rotor's load. Bearings shall be supported by the bearing hub located within the pump housing and shall be sealed via a dynamic seal constructed of Buna-N. Bearings shall be sealed and greased for life. Pumps which use pump lubricant to lubricate the bearings, external bearing frames which allow overhung loading and require long coupling configurations, or close coupling where the rotor is not supported by pump bearings are not acceptable.
  - d. Pump head rotor shall be driven and connected to the gearing via a splined shaft, keyed shafts are not acceptable. Rotor or shaft construction shall be constructed with shear points to allow disengagement from the drive, which shall prevent pump or gearing damage in the event of over torque caused by a locked rotor.
  - e. Pump construction shall include a buffer zone between the gearing and pump head to prevent gearbox contamination in the event of a hose lubricant seal failure. The internal pump bearing hub shall be vented through the rear of the pump housing to allow visual detection in the event of a hose lubricant seal failure.
4. Connectors
  - a. Supply pump with flanged inlet and outlet to ANSI/ASA 150# standards. Flanges and brackets shall be constructed of galvanized steel galvanized to 15 microns minimum and shall be provided with wetted inserts compatible with the process fluid as indicated in the process pump schedule.
  - b. Pump hose shall extend from the pumping chamber to allow visual confirmation of hose/flange insert connection. Flange insert shall be secured to the pump hose via a single band clamp. Securing the hose using multiple clamps or internal compression fittings that cannot be visually verified as secure without disassembly of the pump or pumps is not acceptable.
  - c. Flange supports shall be one-piece and constructed of galvanized steel galvanized to 15 microns minimum and shall be secured to the pump housing via four hex head bolts. Flange supports shall maintain a compression seal between the pump housing and hose.

5. Pump Cover
  - a. Cover shall be constructed of carbon steel ASTM A245 GR36 with a removable clear viewing inspection window constructed of PMMA and sufficiently large enough to replace pressing shoes and allow shim adjustment without removing pump cover.
  - b. The window shall be sufficiently sized to view direction of rotation of the pump and shall be marked with a minimum lubricant registration mark for proper indication of lubricant level when the pump is stationary.
  - c. Pump cover shall be sealed to the pump head via a captive Buna-N quadring seal.
  - d. Pump hardware shall be stainless steel.
6. Frame - Support frame shall be torsion free and constructed of formed hot dipped galvanized steel with a coating thickness of 15 microns. Welded steel or modular adjustable frames are not acceptable.
7. Hose Failure Detector
  - a. Provide five (four duty plus one spare) float-type magnetic reed switches located on the pump to detect leakage of pumped product into the pump housing. Mount the sensor on the rear of the pump housing.
  - b. Supply sensor Normally Closed with the ability for field adjustment to Normally Open.
  - c. Pump manufacturer to supply switch only. CONTRACTOR is responsible for alarm and relay to turn pump off unless otherwise specified herein.
  - d. Float switch shall be rated to the following maxima:  
 $V_{\max} = 240\text{VAC}$ ,  $I_{\max} = 1 \text{ Amp}$ ,  $P_{\max} = 50\text{VA}$
8. Revolution Sensor
  - a. Provide magnetic-type sensor to detect rotor revolutions for each hose pump plus one spare (5 total). Mount sensor on the rear of the pump housing.
  - b. Pump manufacturer shall supply sensor and digital display required to view the number of revolutions. CONTRACTOR is responsible for any additional equipment which may be required to integrate this into their control system, as shown on the Contract Drawings.
  - c. Inductive sensor actuates a non-maintained NO switch when triggering device passes the sensor. When inductive sensor is powered and pump is in operation a pulse waveform is generated.
  - d. Inductive sensor shall be rated to the following maxima:  
 $V_{\max} = 30\text{VDC}$ ,  $I_{\max} = 150 \text{ mA}$ ,  $P_{\max} = 4.5\text{VA}$
9. Digital Panel Meter
  - a. Pump manufacturer shall provide three (two duty plus one spare) 120V Digital Panel Meters, one for each Thickened Sludge Transfer Pump, to connect to the revolution sensor.
  - b. Digital Panel Meters shall be manufactured by Red Lion, Model PAX.
  - c. The Digital Panel Meters shall be installed locally to each Thickened Sludge Transfer Pump. Each Digital Panel Meter shall be provided with an optional analog output card for future tie-in to PLC-WWTP. Digital Panel Meters shall be Model No. PAX-I, so they can accept the analog output cards.
  - d. Digital Panel Meters shall be powered via a 120V circuit.
  - e. Provide power and control wiring per manufacturer's requirements from each Digital Panel Meter to each revolution sensor.
  - f. NEMA 4X enclosures shall be provided for each Digital Panel Meter.
  - g. The location of each Digital Panel Meter shall be coordinated with the Resident Engineer and OWNER in the field. CONTRACTOR shall coordinate the installation, mount, and location of the Digital Panel Meters with the Jog Button and Forward/Reverse Selector Switch Panels.
10. Integral motor winding thermostats shall be embedded and sealed in the end of each stator phase in conjunction with and supplemental to the external overload detection. The pump's control shall shut down the pump should any of these thermostat sensors detect high temperatures and automatically reset once the temperature returns to normal. However, the

pump controls shall be manually reset to restart the motor. A contact shall be provided for remote annunciation of the motor winding shutdown.

11. Pump controls shall be as shown on the Electrical Drawings, as specified with Division 16, Electrical Specifications and Division 17, Instrumentation and in full compliance with this section.

## 2.04 PUMP DRIVE SYSTEM

### A. Gearing

1. Provide gearing with direct-coupled mounting to the pump housing.
2. Provide planetary gearing with direct coupled mounting face and splined hollow shaft output. Gear planetary drive shall be of a modular construction; one, two, or three stages as required with each module consisting of an internal gear meshing with three planetary gears mounted on the planet carrier which shall also engage with the sun pinion. Construct gears and shafts of alloy steel, planet carriers in modular cast iron or steel, and housing of cast iron.
3. Design gear reduction to match output speed requirement of the pump using two- or three-stage gearing and matching torque rating of pumping equipment. Gearing shall be classified for continuous heavy shock duty, AGMA Class II, 24-hour duty with a minimum of 1.4 service factor.

### B. Motors

1. Provide premium efficient, TEFC or TENV, squirrel-cage induction motors, NEMA C face, conforming to the latest applicable requirements of NEMA, IEEE, ANSI, and NEC standards in accordance with Section 15170.
2. Provide motor HP in accordance with Table 11320-1 and Section 15170.
3. Motors are to be designed for continuous duty for 3-phase, 230/460VAC operation, NEMA Design B with torque and starting currents in accordance with NEMA MG1-1993-12.35 and 12.38. Ratings to be based on a 40 degree C ambient 3,300 feet altitude or lower operation with a maximum temperature rise of 80 degree by resistance C at 1.0 service factor (and 90 degree C rise 1.15 service factor).
4. Motors shall be furnished with Class F insulation utilizing materials and insulation systems evaluated in accordance with IEEE 117 classification tests. Motors shall have 1.15 service factor but shall be selected for operation within their full load rating without applying the service factor.
5. Bearings shall be selected to provide L10 rating of 100,000 hours minimum for C-face flexible coupled applications. For frame sizes 56-140, bearings shall be permanently lubricated. For frame sizes 180 and larger, provide capped grease fitting.
6. For frame sizes 180 and larger, motor enclosure including frame, end brackets locking bearing inner caps, fan guard, and conduit box and cover shall be cast iron, ASTM Type A48, Class 25 or better. Conduit box shall be diagonally split with tapped NPT threaded conduit entrance hole, neoprene conduit box cover gasket, neoprene lead seal gasket between box and motor frame, and ground lug. For frame sizes 56-140, motor enclosure, fan guard, conduit box, and cover shall be carbon steel. End shield shall be constructed of aluminum. Conduit box shall be top mounted with F1/F2 conduit entrance holes, grounding lug, and neoprene conduit box gasket between box and motor frame.
7. External cooling fan on TEFC motors shall be corrosion resistant, non-sparking, bi-directional, keyed, clamped, and shouldered on the motor shaft.
8. Motor rotor construction shall be die cast aluminum, fabricated copper, or their respective alloys. Motor shall have copper windings.
9. Motor leads shall be non-wicking type permanently numbered for identification.
10. All motors shall be premium efficient with minimum efficiencies exceeding NEMA MG1-1993 Table 12-10. Motor efficiency shall be determined in accordance with NEMA MG1-1993-12.58.1 and full load efficiency labeled on motor nameplate in accordance with NEMA MG1-1993-12.58.2

11. Motors shall be suitable for use with PWM-type variable frequency drives. Motors frame size 56-180 shall be rated for 10:1 constant torque continuous duty over 6-60 Hertz. Larger frame motors shall be rated for 4:1 constant torque continuous duty over 15-60 Hertz.
  12. Acceptable Manufacturers – Reliance Electric or approved equal.
- C. Drives - The manufacturer of the hose pumps and motors shall provide a certification letter from the manufacturer of the drives indicating that the motors will operate within the ranges specified and are compatible with the variable frequency drives specified in Section 16480.
- D. Control Panel – CONTRACTOR shall provide Thickened Sludge Pump controls as specified in Division 16 and Division 17.

## 2.05 ACCESSORIES

- A. Discharge Pulsation Dampeners
1. CONTRACTOR shall provide pulsation dampeners on the discharge of each pump, plus one shelf spare (3 total).
  2. Dampener shall be chargeable, the appendage type, and consist of a two-part housing and bell shaped flexible bladder.
    - a. Provide chargeable dampener with one-way air inlet valve to prevent product backflow, pressure gauge, and air fill valve. Metal dampeners shall be rated to 300 psi working pressure.
  3. Dampener shall be designed for vertical tee mounting into the discharge line. CONTRACTOR shall provide an appropriate flanged tee with vertical leg for mating to pulsation dampener and horizontal legs for mating to destination discharge piping and pump discharge piping.

Pump	150# Flanged Inlet	Housing Material	Bladder
100 mm	4"	Epoxy coated mild steel	Buna-N

4. CONTRACTOR shall install discharge pulsation dampeners in accordance with the manufacturer's instructions and air-charge the dampener in accordance with the process requirements as recommended by the manufacturer at startup.
5. Pulsation dampener shall be mounted within 3 feet of the pump discharge port. No other equipment shall be installed between the discharge pulsation dampener and pump.

## PART 3 EXECUTION

### 3.01 EQUIPMENT INSTALLATION

- A. Furnish and install the pumping equipment according to the manufacturer's instructions and Sections 01620 and 01730.
- B. Furnish all necessary oil and grease for initial operation.
- C. All equipment shall be checked for damage resulting from shipment before installation. The pump unit shall be securely bolted into place, after it is set.
- D. Install equipment on the foundations as specified in this section and at the locations and elevations shown on the Contract Drawings.
- E. CONTRACTOR shall prove the pump's suction and discharge port connections to process lines are non-leaking and made in a free supported state without need to apply vertical or horizontal pressure to align piping with pump nozzles.

### 3.02 PAINTING

- A. Surface preparation, shop painting, field painting, and other pertinent painting details shall be in accordance with Section 09900 and as outlined below.
- B. Provide pump assembly primed and finish painted within manufacturer's standard paint specification.
  - 1. Primer Coat
    - a. Two-pack (component) epoxy resin primer.
    - b. Dry thickness 20-40 micron.
  - 2. Finish Coat
    - a. Two-pack (component) acrylate isocyanate combination.
    - b. Dry thickness 20-40 micron.
    - c. Provide manufacturer standard color palette for OWNER selection.

### 3.03 EQUIPMENT TESTING

- A. Shop Tests
  - 1. Pump 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.
  - 4. Non-Witnessed Inlet Vacuum Testing
    - a. Test assembled pump running on air.
    - b. Run test for a minimum of 30 seconds and record vacuum reading which must meet or exceed 28-inch Hg vacuum.
    - c. If the pump does not meet specifications, complete tests shall be performed at no additional cost to the OWNER.
    - d. Repeat tests until specified results are obtained.
    - e. Correct or replace promptly all defects or defective equipment revealed by or noted during tests at no additional cost to the OWNER.
- B. Field Tests
  - 1. Perform startup, field testing, and initial operation of equipment in accordance with requirements specified in Section 01620 and below.
  - 2. Field testing of equipment shall be conducted in the presence of the ENGINEER and the equipment manufacturer, or their approved representative.
  - 3. After installation of pumping equipment, and after inspection, operation, testing, and adjustment have been completed by the CONTRACTOR in the presence of the manufacturer's field service technician, CONTRACTOR shall conduct running test for each pump in the presence of the ENGINEER to determine its ability to operate within the performance limits specified and to deliver its rated capacity within the pressure requirements specified. CONTRACTOR shall provide labor, piping, equipment, and materials necessary for conducting all field tests.
  - 4. Make all adjustments necessary to place equipment in specified and working order at the time of above tests.
  - 5. Test pumps on product only.
  - 6. Promptly correct or replace all defective equipment revealed by or noted during tests at no additional cost to the OWNER and repeat tests until specified results acceptable to ENGINEER are obtained.
  - 7. 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.

4.04 SERVICES 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 11325  
DEWATERING PUMP

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Furnish and install one Coagulation Basin Dewatering Pump in Building B, to replace existing Coagulation Basin Dewatering Pump.

1.02. RELATED SECTIONS

- A. Section 01330 - SUBMITTALS.  
B. Section 01620 - EQUIPMENT-GENERAL.  
C. Section 01650 - TESTING AND STARTUP.  
D. Section 09900 - PAINTING.  
E. Section 11300 - PUMPING EQUIPMENT-GENERAL.  
F. Section 15170 - MOTORS.  
G. Section 16480 - VARIABLE FREQUENCY DRIVES.

1.03. DESIGN REQUIREMENTS

- A. The pump, motor, sensors and switches shall be provided on a common skid. The pumps\motor shall be suitable for use with a variable frequency drive (VFD). Pump shall have 6-inch suction connection and 6-inch discharge connection. Pumps shall be selected to perform under following operating conditions:

Capacity ..... 800 gpm

Total dynamic head ..... 43 feet

Total dynamic suction head ..... 12 feet

Maximum repriming lift..... 21 feet

Total discharge static head ..... 0 feet

Minimum submergence depth ..... 5.75 feet

- B. Pump Performance Certifications

1. Solids Handling Capability - All internal passages, impeller vanes, and recirculation ports shall pass a 3 inch spherical solid.

C. Reprime Performance

1. Consideration shall be given to the service anticipated, in which debris is expected to lodge between the suction check valve and its seat, resulting in the loss of the pump suction leg, and siphoning of liquid from the pump casing to the approximate center line of the impeller. Such occurrence shall be considered normal, and the pump must be capable of automatic, unattended operation with an air release line installed.
2. During unattended operation, the pump shall retain adequate liquid in the casing to insure automatic repriming while operating at its rated speed in a completely open system. The need for a suction check valve or external priming device shall not be required.
3. Pump must reprime 12 vertical feet at the specified speed and impeller diameter. Reprime lift is defined as the static height of the pump suction above the liquid, while operating with only one-half of the liquid remaining in the pump casing. The pump must reprime and deliver full capacity within 5 minutes after the pump is energized in the reprime condition. Reprime performance must be confirmed with the following test set-up:
  - a. A check valve to be installed downstream from the pump discharge flange. The check valve size shall be equal (or greater than) the pump discharge diameter.
  - b. A length of air release pipe shall be installed between pump and the discharge check valve. This line shall be open to atmosphere at all times duplicating the air displacement rate anticipated at a typical pump station fitted with an air release valve.
  - c. No restrictions in the pump or suction piping will prevent the siphon drop of the suction leg. Suction pipe configuration for reprime test shall incorporate a 2 feet minimum horizontal run, a 90-degree elbow and vertical run at the specified lift. Pipe size shall be equal to the pump suction diameter.
  - d. Impeller clearances shall be set as recommended in the pump service manual.
  - e. Repeatability of performance shall be demonstrated by testing five consecutive reprime cycles. Full pump capacity (flow) shall be achieved within 5 minutes during each cycle.
  - f. Liquid to be used for reprime test shall be water.
  - g. Certified reprime performance test results, prepared by the manufacturer, and certified by a registered professional engineer, shall be submitted for approval prior to shipment.

D. Manufacturer's Warranty

1. The pump manufacturer shall warrant the pump equipment to be of quality construction, free of defects in material and workmanship. A written warranty shall include specific details described below.
2. All equipment, apparatus, and parts furnished shall be warranted for one year, excepting only those items that are normally consumed in service, such as oils, grease, packing, gaskets, O-rings, etc. The pump manufacturer shall be solely responsible for warranty of the pump equipment and all components.

3. Components failing to perform as specified by the engineer, or as represented by the manufacturer, or as proven defective in service during the warranty period, shall be replaced, repaired, or satisfactorily modified by the manufacturer without cost of parts or labor to the Owner.

#### 1.04. SUBMITTALS

- A. Shop drawings in accordance with Sections 01330 and 01620.
- B. Manufacturer's certificate, including performance affidavit for all equipment furnished under this section and in accordance with Sections 01330 and 01620.
- C. Operation and maintenance instructions and manuals in accordance with Sections 01300 and 01620.
- D. Manufacturer's instructions and services in accordance with Sections 01300 and 01620.

#### 1.05. SPARE PARTS

- A. Provide one spare motor of the type specified herein.
- B. At a minimum, provide all spare parts recommended by the manufacturer required for operating the pump for a minimum of five years including:
  1. One wear plate assembly.
  2. One pressure relief valve.
  3. One suction flange gasket.
  4. One 6" flap valve assembly.
  5. One impeller and impeller shaft.
  6. One seal assembly.
  7. One spare key.
  8. Gasket, O-ring and shaft repair kit.

### PART 2 PRODUCTS

#### 2.01. MANUFACTURER

- A. The equipment manufacturer and model shall be the following or approved equal:
  1. Gorman Rupp, Type T6A3S-B, size 6x6.

#### 2.02. PUMP DESIGN

- A. Pumps shall be horizontal, self-priming centrifugal type. Pump solids handling capability and performance criteria shall be in accordance with requirements listed under these specifications.

B. Materials and Construction Features

1. Pump Casing - Casing shall be cast iron Class 30 with integral volute scroll. Casing shall incorporate following features:
  - a. Mounting feet sized to prevent tipping or binding when pump is completely disassembled for maintenance.
  - b. Fill port cover plate, 3-1/2-inch diameter, shall be opened after loosening a hand nut/clamp bar assembly. In consideration for safety, hand nut threads must provide slow release of pressure, and the clamp bar shall be retained by detente lugs. A Teflon gasket shall prevent adhesion of the fill port cover to the casing.
  - c. Casing drain plug shall be at least 1-1/4-inch NPT to ensure complete and rapid draining.
  - d. Liquid volume and recirculation port design shall be consistent with performance criteria listed under Part 1 of this section.
2. Cover Plate - Cover plate shall be cast iron Class 30. Design must incorporate following maintenance features:
  - a. Retained by hand nuts for complete access to pump interior. Cover plate removal must provide ample clearance for removal of stoppages, and allow service to the impeller, seal, wear plate or check valve without removing suction or discharge piping.
  - b. A replaceable wear plate secured to the cover plate by weld studs and nuts shall be AISI 1015 HRS.
  - c. In consideration for safety, a pressure relief valve shall be supplied in the cover plate. Relief valve shall open at 75 to 200 psi.
  - d. Two O-rings of Buna-N material shall seal cover plate to pump casing.
  - e. Pusher bolt capability to assist in removal of cover plate. Pusher bolt threaded holes shall be sized to accept same retaining cap screws as used in rotating assembly.
  - f. Easy-grip handle shall be mounted to face of cover plate.
3. Rotating Assembly - A rotating assembly, which includes impeller, shaft, mechanical shaft seal, lip seals, bearings, seal plate and bearing housing, must be removable as a single unit without disturbing the pump casing or piping. Design shall incorporate following features:
  - a. Seal plate and bearing housing shall be cast iron Class 30. Separate oil filled cavities, vented to atmosphere, shall be provided for shaft seal and bearings. Cavities must be cooled by the liquid pumped. Three lip seals will prevent leakage of oil.
    - 1) The bearing cavity shall have an oil level sight gauge and fill plug check valve. The clear sight gauge shall provide easy monitoring of the bearing cavity oil level and condition of oil without removal of the fill plug check valve. The check valve shall vent the cavity but prevent introduction of moist air to the bearings.

- 2) The seal cavity shall have an oil level sight gauge and fill/vent plug. The clear sight gauge shall provide easy monitoring of the seal cavity oil level and condition of oil without removal of the fill/vent plug.
  - 3) Double lip seal shall provide an atmospheric path providing positive protection of bearings, with capability for external drainage monitoring.
- b. Impeller shall be ductile iron, two-vane, semi-open, non-clog, with integral pump out vanes on the back shroud. Impeller shall thread onto the pump shaft and be secured with a lock screw and conical washer.
  - c. Shaft shall be AISI 4140 alloy steel unless otherwise specified by the engineer, in which case AISI 17-4 pH stainless steel shall be supplied.
  - d. Bearings shall be anti-friction ball or tapered roller type of proper size and design to withstand all radial and thrust loads expected during normal operation. Bearings shall be oil lubricated from a dedicated reservoir. Pump designs, which use the same oil to lubricate the bearings and shaft seal, shall not be acceptable.
  - e. Shaft seal shall be oil lubricated mechanical type. The stationary and rotating seal faces shall be tungsten titanium carbide alloy. Each mating surface shall be lapped to within three light bands flatness (35 millionths of an inch), as measured by an optical flat under monochromatic light. The stationary seal seat shall be double floating by virtue of a dual O-ring design; an external O-ring secures the stationary seat to the seal plate, and an internal O-ring holds the faces in alignment during periods of mechanical or hydraulic shock (loads which cause shaft deflection, vibration, and axial/radial movement). Elastomers shall be viton. Cage and spring to be AISI 316 stainless steel. Seal shall be oil lubricated from a dedicated reservoir. The same oil shall not lubricate both shaft seal and shaft bearings. Seal shall be warranted in accordance with requirements listed under Part 1 of this section.
  - f. Pusher bolt capability to assist in removal of rotating assembly. Pusher bolt threaded holes shall be sized to accept same cap screws as used for retaining rotating assembly.
4. Adjustment of the impeller face clearance (distance between impeller and wear plate) shall be accomplished by external means.
    - a. Clearances shall be maintained by external shimless cover plate adjustment, utilizing collar and adjusting screw design for incremental adjustment of clearances by hand. Requirement of realignment of belts, couplings, etc., shall not be acceptable. Cover plate shall be capable of being removed without disturbing clearance settings.
    - b. There shall be provisions for additional clearance adjustment in the event that adjustment tolerances have been depleted from the cover plate side of the pump. The removal of stainless steel shims from the rotating assembly side of the pump shall allow for further adjustment as described above
    - c. Clearance adjustment, which requires movement of the shaft only, thereby adversely affecting seal working length or impeller back clearance, shall not be acceptable.
  5. Suction check valve shall be molded Neoprene with integral steel and nylon reinforcement. A blow-out center shall protect pump casing from hydraulic shock or excessive pressure. Removal or installation of the check valve must be accomplished through the cover plate opening, without disturbing the suction piping. Sole function of check valve shall be to save

energy by eliminating need to reprime after each pumping cycle. Pumps requiring a suction check valve to assist reprime will not be acceptable.

6. Spool flanges shall be one-piece cast iron, Class 30 fitted to suction and/or discharge ports. Each spool shall have one 1-1/4-inch NPT and one 1/4-inch NPT tapped hole with pipe plugs for mounting gauges or other equipment.

#### 2.03. MOTOR

- A. Furnish and install an inverter duty motor capable of connection to the pump shaft by means of a belt and suitable for operation by a VFD.
- B. Power supply shall be 460-volt, 3 phase, 60 Hertz.
- C. Maximum brake horsepower shall be 20 HP.
- D. Motor shall be positioned higher than the pump by means of a prefabricated steel base supplied by the pump manufacturer. Distance from the centerline of the pump shaft to the centerline of the motor shaft shall be a minimum of 34.50 inches.
- E. Provide a protective guard to surround the belt.

#### 2.04. CONTROLS

- A. The manufacturer shall supply a VFD in accordance with Section 16480.
- B. Pump, motor and VFD shall be capable of operation with an automatic control system designed to maintain a preset, adjustable wet well (sump pit) level. The VFD/motor/pump combination shall automatically adjust the speed/pumping rate based on a 4-20 mA control signal from a Schneider Electric M340 PLC-based wet well level controller, provided by others.
- C. When the VFD receives a start signal from the wet well level controller, it will start and operate the pump at full speed for an adjustable, preset period of time (programmed in the VFD), selected to allow the pump to fully prime. Once this preset time period expires, i.e., once the pump is primed, the VFD shall accept a 4-20mA control signal from the wet well controller and will automatically speed up or slow down, based on this signal, to maintain the preset wet well level.
- D. Provide manufacturer recommended protective sensors and switches (i.e., pump casing temperature switches). Such sensor shall be installed on the pump/motor skid. These sensors and switches shall be wired to the VFD and shall automatically shut down the VFD/motor/pump combination when and alarm condition is detected and shall activate an alarm on the VFD and provide a Form C contact closure for remote indication of the alarm.

### PART 3 EXECUTION

#### 3.01. EXAMINATION

- A. Contractor shall off-load equipment at installation site using equipment of sufficient size and design to prevent injury or damage. Immediately after off-loading, contractor shall inspect complete pump and appurtenances for shipping damage or missing parts. Any damage or discrepancy shall be noted in written claim with shipper prior to accepting delivery. Validate all pump serial numbers and parts lists with shipping documentation. Notify the manufacturer's representative of any unacceptable conditions noted with shipper.

### 3.02. INSTALLATION

- A. Install, level, align, and lubricate pump(s) as indicated on project drawings. Installation must be in accordance with written instructions supplied by the manufacture at time of delivery.
- B. Suction pipe connections are vacuum tight. Fasteners at all pipe connections must be tight. Install pipe with supports and thrust blocks to prevent strain and vibration on pump piping. Install and secure all service lines (level control, air release valve or pump drain lines) as required in wet well.
- C. Check motor and control equipment for compatibility with site voltage. Install and test the station ground prior to connecting line voltage to control panel.
- D. Prior to applying electrical power to any motors or control equipment, check all wiring for tight connection. Verify that protective devices (fuses and circuit breakers) conform to project design documents. Manually operate circuit breakers and switches to ensure operation without binding. Open all circuit breakers and disconnects before connecting utility power. Verify line voltage, phase sequence and ground before actual start-up.
- E. After all anchor bolts, piping and control connections are installed, completely fill the grout dam in the pump station base with non-shrink grout.

### 3.03. TESTING

- A. Operational Test
  - 1. Prior to acceptance by owner, an operational test of all pumps, drives, and control systems shall be conducted to determine if the installed equipment meets the purpose and intent of the specifications. Tests shall demonstrate that all equipment is electrically, mechanically, structurally, and otherwise acceptable; it is safe and in optimum working condition and conforms to the specified operating characteristics.
  - 2. After construction debris and foreign material has been removed from the wet well, contractor shall supply clear water volume adequate to operate station through several pumping cycles. Observe and record operation of pumps, suction and discharge gage readings, ampere draw, pump controls, and liquid level controls. Check calibration of all instrumentation equipment, test manual control devices, and automatic control systems. Be alert to any undue noise, vibration or other operational problems.

END OF SECTION

## SECTION 11333

### POLYMER FEED SYSTEM

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

###### A. Scope:

1. The CONTRACTOR shall furnish and install the polymer feed system ready to operate, complete with all necessary piping, valves, fittings, and accessories in compliance with the Specifications and the Contract Drawings.
2. Polymer feed system shall be provided by a single manufacturer (supplier), included in a skid-mounted package, who shall be responsible for the performance and compatibility of the entire system.

###### B. General:

1. Provide two polymer feed systems specially designed, constructed and installed in a manner recommended by polymer manufacturers to the Thickened-Clarifiers and the Belt Filter Presses.
2. The Thickener-Clarifier polymer feed system (PS-1) shall be capable of pumping neat polymer the Distribution Box upstream of the Thickener-Clarifiers. The bulk polymer totes, polymer feed pump skids, and Polymer Feed Pump Skid PFS-1 shall be located in "Building E," near the Belt Filter Presses and as shown on the Contract Drawings.
3. The Belt Filter Press polymer feed system (PS-2) shall be capable of pumping neat polymer to the new Belt Filter Presses. The bulk polymer tanks, polymer feed pump skids, and Polymer Feed Pump Skid (PFS-2) shall be located in "Building E," near the Belt Filter Presses and as shown on the Contract Drawings.
4. The Drawings are for purposes of guidance and for showing functional features and required external connections. They do not show all components required to accomplish the desired results nor all components required to interface with the equipment. Provide all miscellaneous parts, equipment, and devices necessary to make the polymer feed system complete and operational.
5. The Drawings show a general arrangement of the equipment. Dimensions of the equipment are not shown, as they may vary with different manufacturers. Piping arrangements may have to be changed in order to accommodate the equipment furnished. Any costs associated with such changes shall be included as part of the Work defined herein at no cost to the Owner.
6. Design and build all equipment for 24-hour continuous service at any and all points within the specified range of operation requiring only that degree of maintenance generally accepted as peculiar to the specific type of equipment supplied.
7. Neat polymer is defined as the polymer received from a supplier prior to dilution.

##### 1.02 RELATED SECTIONS

- A. Section 01331 - SHOP DRAWING PROCEDURES.
- B. Section 01620 - EQUIPMENT-GENERAL.
- C. Section 01660 - STORAGE OF MATERIAL.
- D. Section 01730 - INSTALLATION.
- E. Section 01731 - CONNECTIONS TO EXISTING FACILITIES.
- F. Section 01751 - STARTING AND PLACING EQUIPMENT IN OPERATION.



- G. Section 01781 - OPERATION AND MAINTENANCE DATA.
- H. Section 09900 - PAINTING.
- I. Section 11350 - BELT FILTER PRESSES.
- J. Section 15060 - INSIDE PROCESS PIPING.
- K. Section 15170 - MOTORS.
- L. Section 16161 - CONTROL PANELS.
- M. Section 16480 - VARIABLE FREQUENCY DRIVES.

All electrical equipment, control panels, and wiring shall be in full conformance with Division 16 electrical specifications.

#### 1.03 REFERENCES

- A. American National Standards Institute (ANSI).
- B. American National Standards Institute (ANSI).
- C. American Water Works Association (AWWA).
- D. American Society for Testing and Materials (ASTM).
- E. Institute of Electrical and Electronics Engineers (IEEE).
- F. National Electrical Code (NEC).
- G. National Sanitation Foundation (NSF).

#### 1.04 SUBMITTALS

- A. Shop drawings in accordance with Section 01331.
- B. Manufacturer's certificates including Performance Affidavit for all equipment furnished under this section in accordance with Section 01620.
- C. Manufacturer's installation instructions and test results in accordance with Section 01620.
- D. Operation and Maintenance Instructions - Complete operation and maintenance instructions are required for this equipment in accordance with Section 01781. Specific operation and maintenance instructions shall be prepared by the system supplier.
- E. Operation and maintenance instructions for individual components should be included with the package; however, written instructions, drawings, and schematics must cover the complete system, not just specific components.
- F. Record Drawings - Submit complete as-built wiring diagrams for all control panels furnished with this equipment. Diagrams shall show all electrical components within the panel and show wire color and numbering and terminal numbering as provided in the panel. As-built diagrams shall be submitted in accordance with Section 01780.

## 1.05 QUALITY ASSURANCE

### A. Qualifications:

1. Manufacturer shall have minimum of 5 years' experience producing substantially similar equipment to that required and shall be able to document of at least five installations in satisfactory operation for at least five years.

### B. Component Supply and Compatibility:

1. Obtain all materials and equipment included in this Section regardless of component manufacturer, from a single polymer feed system supplier.
2. Polymer feed system manufacturer shall review and approve or prepare all Shop Drawings and other submittals for components associated with Thickener-Clarifier polymer feed system (PS-1) furnished under this Section.
3. The Belt Filter Press manufacturer shall review and approve or prepare all Shop Drawings and other submittals for components associated with Belt Filter Press polymer feed system (PS-2) furnished under this Section.
4. Materials and equipment shall be fully compatible with specified service conditions, and shall be integrated into overall assembly by polymer feed system supplier.

## 1.06 DELIVERY, STORAGE AND HANDLING

### A. Packing, Shipping, Handling, and Unloading:

1. Deliver materials and equipment to site to ensure uninterrupted progress of the Work. Deliver anchorage materials to be embedded in concrete in ample time to prevent delaying the Work.
2. Inspect all boxes, crates, and packages upon delivery to the Site and notify ENGINEER in writing of loss or damage to products. Promptly remedy loss and damage to new condition in accordance with manufacturer's instructions.
3. Conform to Sections 01640 and 01660.

### B. Storage and Protection:

1. Keep materials and equipment off ground using pallets, platforms, or other supports. Protect steel, packaged materials, and electronics from corrosion and deterioration.
2. Conform to Sections 01640 and 01660.

## 1.07 SPARE PARTS

### A. CONTRACTOR shall provide one spare progressive cavity pump in accordance with the recommendations of the pump manufacturer. At a minimum, the following spare parts shall be provided for each model of pump supplied:

1. One neat polymer progressive cavity pump stator for each model.
2. One banding clamp tool for replacement of the progressive cavity neat polymer pump pin joint banding clamps.
3. Two polymer solution feed progressive cavity pump stators.
4. One neat polymer check valve for each model of blend unit, complete.
5. All required tools and repair kits required for maintenance of the equipment provided.
6. One complete uninstalled spare neat polymer feed pump per blend unit.
7. One complete uninstalled spare polymer solution feed pump.
8. One fully assembled Polymer Feed Pump Skid.

## 1.08 WARRANTY

### A. Provide equipment warranty in accordance with the General Conditions, Supplementary Conditions, and Section 01620.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. The Polymer Feed Pump Skids shall be manufactured by:
  - 1. Fluid Dynamics, Inc.
  - 2. USGI Chemical Feed Solutions.
  - 3. EnPro Technologies.
  - 4. Or approved equal.
- B. The Polymer Day Tanks and Weight Scales shall be manufactured by:
  - 1. Belding Tank Technologies, Inc.
  - 2. Augusta Fiberglass.
  - 3. Chemtainer.
  - 4. Or approved equal.
- C. The polymer feed pumps shall be manufactured by:
  - 1. Moyno.
  - 2. NETZSCH Group.
  - 3. Or approved equal.

### 2.02 DESIGN CRITERIA

- A. The polymer dilution/feed unit shall be capable of automatically metering, diluting, activating and feeding liquid polymer with water.
- B. The polymer dilution/feed unit shall be designed for automatic metering, dilution, activation, and feeding of liquid emulsion polymer-to-water solution concentrations between 0.25 and 1.0 percent.
- C. The system shall be capable of handling various emulsion, solution, or pre-wetted dry polymers with apparent viscosities up to 30,000 centipose measured with Brookfield viscometer #4 spindle at 12 revolutions per minute for full capacity and up to 75,000 centipose at reduced pump output.

### 2.03 PERFORMANCE REQUIREMENTS

- A. Polymer feed system shall be capable of continuous accurate feeding within  $\pm 5$  percent at any setting of liquid chemical solution to the application points as shown on the Contract Drawings. Polymer activation efficiency shall be consistent over the full range of dilution water flow.
- B. Chemical feed rate shall be automatically varied to provide pumping rate proportional to flow and/or sludge density.
- C. The polymer feed systems shall meet the parameters listed in the following table(s):

**Polymer Feed System (PS-1) Design Criteria**

Parameter	Value
Neat Polymer Type	Emulsion polymer (to be determined with jar testing during startup)
Activity	30-75 percent active
Polymer Feed Pump Skid (PFS-1)	
Quantity	1
Dimensions	36 inches L x 28 inches W x 47 inches H
Neat polymer pump type	Progressive cavity

Parameter	Value
Neat polymer pump flow	5 GPH
Neat polymer pump HP	0.5 HP
Maximum dilution water flow	2400 GPH
Dilution water pressure	50-100 psi
Diluted polymer solution activity range	0.25 – 0.5 percent active
Polymer Day Tank (PAT-1)	
Quantity	1
Working volume	100 gallons
Polymer Feed Pumps (PFP-1, PFP-2)	
Quantity	2
Type	Progressive cavity
Maximum Flow	10 GPH
HP	1 HP
Dilution water pressure	50-100 psi

#### Polymer Feed System (PS-2) Design Criteria

Parameter	Value
Neat Polymer	
Type	Emulsion polymer (to be determined with jar testing during startup)
Activity	30-75 percent active
Polymer Feed Pump Skid (PFS-2)	
Quantity	1
Dimensions	40 inches L x 234 inches W x 72 inches H
Neat polymer pump type	Progressive cavity
Neat polymer pump flow	5 GPH
Neat polymer pump HP	0.5 HP
Maximum dilution water flow	2400 GPH
Dilution water pressure	50-100 psi
Diluted polymer solution activity range	0.25 – 0.5 percent active
Polymer Day Tank (PAT-2)	
Quantity	1
Working volume	50 gallons
Polymer Feed Pumps (PFP-3, PFP-4)	
Quantity	2
Type	Progressive cavity
Maximum Flow	5 GPH
HP	1 HP
Dilution water pressure	50-100 psi

#### 2.04 SERVICE CONDITIONS

- A. Dilution water supply pressure shall be a minimum of 35 psi greater than the mixing chamber discharge pressure.
- B. Control panel supply voltage shall be: 120 VAC.

## 2.05 EQUIPMENT

- A. The prepackaged system (PFS-1, PFS-2) shall be a complete package that automatically dilutes, activates, and feeds liquid polymer and water. Each prepackage system shall reside on 304 or 316 stainless steel skids. Mixing chambers shall instantaneously invert neat polymer into solution, producing a thoroughly diluted and complete activated homogeneous blend. The system shall include, but is not limited to, the following components:
1. Neat polymer pump and pump controller.
  2. Dilution assembly including:
    - i. Water inlet manifold;
    - ii. Dilution water flowmeters;
    - iii. Dilution controls.
  3. Multi-stage mixing assembly including:
    - i. Liquid polymer activation chamber.
    - ii. Neat polymer check valve.
  4. Clear solution discharge assembly.
  5. Local control panel.
  6. Stainless steel frame.
  7. Associated pressure gages, transmitters, valves and solenoid valves required for operation detailed in this Section and as shown.
- B. Neat Polymer Pump
1. Each Polymer Feed Pump Skid shall be provided with an integrally mounted, positive displacement, progressive cavity pump for volumetrically metering neat polymer from the raw polymer supply totes to the multi-stage mixing assembly.
  2. The neat polymer pump shall have a range of 0.25 to 5 GPH of neat polymer.
  3. The pump shall be a progressive cavity pump with attached connection fittings. Pump controls will be via local VFD with HMI for operator interface,
  4. Pump materials shall be inert to all polymers and carrier materials and shall be capable of handling all liquid emulsion and dispersion polymers.
  5. Pump shall be constructed of stainless steel and Viton.
  6. The shaft seal shall be packing type, Viton, ceramic, Teflon or carbon.
  7. Pump shall have maximum discharge pressure of 80 psig.
  8. Pump electrical components shall be 120-volt AC, 60 Hertz, single phase.
  9. Pump shall have a minimum 20:1 turndown ratio between maximum and minimum flow.
  10. A gear reducer shall be provided to produce a maximum pump shaft speed of not more than 545 rpm. The motor shall be controlled by a VFD controller located at the Polymer Feed Pump Skid.
- C. Dilution Water Assembly
1. The dilution water flow rate shall be monitored by rotameters-type flow meter having a range of 0 to 2400 GPH and accuracy of  $\pm 5$  percent of full scale flow. Unions shall be provided on the inlet and outlet of the rotameter to allow easy removal for cleaning.
    - a. Materials of Construction
      - 1) Metering Tube - Machined cast acrylic.
      - 2) Internal Components - 316L stainless steel.
      - 3) Fitting – PVC.
      - 4) Elastomers - Buna-N.
  2. Unit shall have an electric (120 VAC) solenoid valve with NEMA 4 rated coil for On/Off control of total dilution water flow.
  3. Materials of Construction - Brass body, NBR seal.
  4. The dilution water flow rate shall be manually adjusted through a flow control valve connected directly to the mixing chamber. Valve shall be constructed of PVC body, stainless steel needle, and stainless steel seat.
  5. Provide a 2-1/2-inch stainless steel liquid filled pressure gauge, with a range of 25-100 psi, to monitor dilution water inlet pressure.

- D. Multi-Stage Mixing/Activation Chamber
1. Provide a multi-staged, blending device specifically designed to dilute and activate emulsion polymers with viscosity up to 75,000 cps and active content up to 75 percent.
  2. The liquid polymer activation chamber mixing energy shall be staged such that it provides for high, non-damaging mixing energy over the full operating range of the system, which then dissipates through a series of concentric chambers. The system shall be designed for use with either potable or non-potable water. The type of dilution water used shall not affect the specified performance in any way. A mixing chamber drain valve with 1/2-inch fitting shall be provided. The mixing chamber shall have a maximum rated pressure of 150 psi. The mixing chamber shell or body shall be constructed of PVC.
  3. At no time shall polymer be exposed to excessive shear.
  4. The mixing chamber shall be transparent to allow the operator to view the action within.
  5. Provide a stainless steel, adjustable range pressure relief valve on mixing chamber with a range of 50 to 175 psi.
  6. Provide a neat polymer check valve designed to isolate neat polymer from dilution water. The valve shall have a Teflon body and stainless steel ball. The valve shall be readily accessible for cleaning and shall be easily disassembled. Valve shall be located outside of the mixing chamber and shall not require mixing chamber disassembly for servicing.
  7. The mixing chamber shall include a flushing provision for the mechanical seal utilizing incoming water flow to continuously flush the seal area when in operation.
- E. Solution Discharge Assembly
1. A 304 stainless steel solution discharge connection shall be provided.
  2. The discharge assembly shall include an adjustable mixing chamber pressure relief valve piped to the mixing chamber drain and a pressure gauge.
  3. Provide a 2-1/2-inch stainless steel liquid filled pressure gauge, with a range of 0-160 psi, to monitor system discharge pressure.
- F. Motors and Drives
1. All motors and drives shall be in full accordance with Section 15170 and this section.
  2. Drive motors for the polymer system and mixers shall be provided by the equipment manufacturer designed for specific use with the process equipment being served.
  3. Drives shall be rated for continuous 24-hour operation at ambient temperatures from 4 to 40 degrees C. Drives shall be NEMA 4X.
  4. Drive shall have a membrane keypad for easy programming. Controls shall allow for manual or automatic flow adjustment.
  5. Drive shall be capable of accepting a 4-20 mA signal to automatically pace pump speed and be capable of remote start/stop. Drive shall also allow for input scaling and provide 4-20 mA analog outputs, and drive shall be capable of digital communication.
  6. Drive shall have a four-digit LED display for the following parameters: motor rpm, flow rate, dispense volume.
  7. Pump run status, speed indication shall be sent from the neat polymer VFD that is located in the Polymer Feed Pump Skid control panel.
- G. Polymer Feed Pump Skid Control Panel
1. Provide a control panel integrally mounted on the polymer feed unit, factory prewired with all the necessary transformers, wiring, conduit, relays, timers, switches, fuses, indicating lights, and all other components required for a complete functional system as specified.
  2. Control enclosure shall be NEMA 4X stainless steel.
  3. Control panel shall be furnished as a coordinated assembly requiring only field connections of the power and control circuits for a complete and operating installation as specified. Control panels shall be fabricated and include all provisions as specified in Section 16161.
  4. An automatic flush system shall be provided to automatically flush the dilution system at the end of each cycle.

5. Control devices shall include:
    - a. Main Power/System ON-OFF-REMOTE selector switch.
    - b. Panel-mounted potentiometer for local control of pump speed.
    - c. Alarm RESET push button.
  6. In addition to the control devices listed above, furnish the following panel mounted devices:
    - a. System RUNNING indicating light (Blue).
    - b. Low water differential pressure alarm.
    - c. LED display of pump rate.
    - d. Low polymer flow alarm.
  7. Panel shall provide the following signals in a dedicated, contiguous field terminations strip within the polymer control panel for wiring to the plant control system:
    - a. Dry, maintained contact closure for remote start/stop control of the polymer system from the plant wide PLC system).
    - b. 4-20 mA speed control signal from the plant wide PLC system to pace the polymer metering pump.
    - c. 4-20 mA speed feedback signal indicating actual polymer pump speed in both Local and Remote modes.
  8. Provide isolated dry contact outputs to the PLC panel for the following:
    - a. System RUNNING status.
    - b. System in REMOTE mode status.
    - c. Low water pressure alarm.
    - d. Low polymer flow alarm.
    - e. Low polymer weight within the Day Tank alarm.
    - f. Neat polymer pump running
    - g. Neat polymer pump speed
- H. System Operation:
1. Local Mode:
    - a. The system ON-OFF-REMOTE switch will control power to a starting relay and timing relays for the polymer feed pump and the solenoid valves and mixer motors (where applicable). When turned to ON, the unit shall start and run.
    - b. System common alarm shall include any of the following:
      - 1) Overload relay trip.
      - 2) No dilution water after a preset time.
      - 3) No polymer flow after a preset time (where applicable).
    - c. The polymer feed pump will be shut down and will not run when the following conditions exist:
      - 1) Low dilution water flow for adjustable time delay period.
      - 2) Mixer motor overload, where applicable.
      - 3) System ON-OFF-REMOTE switch in OFF position.
      - 4) Day Tank Weigh Scale registers a low polymer weight within the Day Tank.
    - d. When the System ON-OFF-REMOTE switch is placed in the OFF position or when the System is de-energized by the remote control while the System ON-OFF-REMOTE switch is placed in the REMOTE position, the solenoid valves will remain open and the mixer will continue to run for an adjustable preset time after which the valves will close and the motor will stop.
  2. System Operation. Remote Mode:
    - a. Start the polymer feed system in the sequence described above when a start command is received from the applicable PLC.
    - b. Feeder speed shall be controlled based on a 4-20 mADC signal from the applicable PLC.
    - c. Alarm and shutdown the system in the same manner as described above for Local Mode.

- I. Polymer Feed Pump Skid
  - 1. The system's frame shall be of rugged 304 or 316 stainless steel construction. No mild steel shall be used. All piping shall be rigidly supported.
  - 2. Size as recommended by manufacturer, but the overall system dimensions shall not exceed 70 inches H x 28 inches D x 47 inches W. Stands shall be designed to place operator controls at a height, which is practical for normal operation.
  - 3. Stands shall be securely fastened to the concrete base pads with 316 stainless steel anchor bolts provided by the manufacturer.
- J. Polymer Day Tanks and Weight Scales:
  - 1. Polymer Day Tanks and Weight Scales shall be provided with capacities as specified in Article 2.03.
    - a. Polymer Day Tanks shall be constructed of FRP and shall be cylindrical, flat bottom, close-topped, and vented with a minimum thickness of 0.280 inches.
    - b. Polymer feed system supplier shall provide a weight scale as specified in Section 17350.
  - 2. Polymer Day Tank Mixers for mixing polymer within the neat polymer storage tanks.
    - a. Mixers shall include a 1/2 hp, 350 rpm TEFC motor and single mixing blade. The mixer manufacture shall be responsible for determining the length and diameter of the mixer.
    - b. Mixers shall be designed to be mounted to the side of the storage tank. Shaft and propeller shall be constructed of 316 stainless steel.
    - c. Mixers shall be suitable for wiring to 120 VAC/1 phase/ 60 HZ, with grounded three-prong plug. Power cord shall be chemically resistant and 15-ft. length.
- K. Polymer Feed System shall be placed on Chemical Containment Skids as indicated on the Contract Drawings.
  - 1. The system's frame shall be of rugged 304 or 316 stainless steel construction. No mild steel shall be used. All piping shall be rigidly supported.
  - 2. Chemical Containment Skids shall be as shown on the Contract Drawings and shall be designed to place operator controls at a height which is practical for normal operation.
  - 3. Stands shall be securely fastened to the concrete base pads with 316 stainless steel anchor bolts provided by the manufacturer.

## PART 3 EXECUTION

### 3.01 INSPECTION

- A. Inspect the area in which the equipment is to be installed.
- B. Verify that the equipment is ready for installation.
- C. Notify the Engineer of any discrepancies. CONTRACTOR shall verify that structures, pipes and equipment are compatible.

### 3.02 EQUIPMENT INSTALLATION

- A. The equipment shall be installed in accordance with the manufacturer's recommendations, as outlined in the Contract Drawings, and in accordance with Section 01620.

### 3.03 PAINTING

- A. Surface preparation and painting shall conform to the requirements of Section 09900.



3.04 SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. The CONTRACTOR shall arrange for the equipment manufacturer to furnish the services of a qualified representative in accordance with Section 01620.
- B. A written report covering the representative's findings and installation approval shall be mailed directly to the ENGINEER covering all inspections and outlining in detail any deficiencies noted.

END OF SECTION

## SECTION 11335

### THICKENER-CLARIFIER SLUDGE COLLECTION EQUIPMENT

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. Furnish and install sludge collection equipment for two (2) Thickener-Clarifier tanks, ready to operate, complete with all necessary accessories in compliance with the specifications and as shown on the Contract Drawings, including but not limited to the following components for each unit:
  - 1. Influent feedwell.
  - 2. Torque tube.
  - 3. Sludge collection rake arms, pickets, and scrapers.
  - 4. Center drive mechanism.
  - 5. Overload devices, alarms and local controls.
  - 6. Anchor bolts.

##### 1.02 RELATED SECTIONS

- A. General Contract Conditions
- B. Section 01331 - SHOP DRAWING PROCEDURES.
- C. Section 01620 - EQUIPMENT-GENERAL.
- D. Section 01660 - STARTUP OF SYSTEMS.
- E. Section 01730 - INSTALLATION DATA.
- F. Section 01751 - STARTING AND PLACING EQUIPMENT IN OPERATION.
- G. Section 01781 - OPERATION AND MAINTENANCE DATA.
- H. Section 02669 - PAINTING OF THICKENER-CLARIFIER TANKS.
- I. Section 05500 - MISCELLANEOUS FABRICATIONS.
- J. Section 05520 - ALUMNIUM RAILINGS.
- K. Section 05531 - GRATING.
- L. Section 09990 - PAINTING.
- M. Section 11201 - TUBE SETTLER SYSTEM.
- N. Section 11287 - WEIR PLATES AND ACCESSORIES.
- O. Section 15170 - MOTORS.

All electrical equipment and wiring shall be in full conformance with Division 16, Electrical Specifications.

### 1.03 REFERENCES

- A. AISC
- B. ANSI/AGMA 2001-B88
- C. ANSI/AGMA 2001-A87
- D. AGMA 6034-B92
- E. AGMA 2004-B89
- F. ASTM A36
- G. ASTM A48
- H. ASTM A536
- I. ASTM B427
- J. AISI 4142
- K. AISI 4320
- L. AISI 8620
- M. AWS D.1.1

### 1.04 PERFORMANCE REQUIREMENTS

- A. The thickener/clarifier equipment shall be suitable for collecting and removing settled sludge as specified herein. Equipment shall be of the center shaft drive type with a center driving mechanism. The entire structure and mechanism shall be supported on the thickener/clarifier walls. The center driving mechanism shall rotate a suspended torque tube having rake arms with scraper blades attached at a speed suitable for the material to be collected.
- B. The complete machine for each tank shall be of sufficient structural strength and shall have sufficient mechanical ability to move through sludge up to a 6 percent total solids content accumulated to a depth of 3 feet at the side walls and in accordance with the Schedule of Service Conditions specified below. The equipment shall also be structurally capable to sweep in the corners of the tank where the walls meet the floor slab.
- C. The thickener drive shall be designed to operate at a minimum 20-year continuous AGMA rated torque of 8,000 foot-pounds.
- D. The drive and structural design shall be capable of sustaining a momentary peak load of three times the worm gear torque rating sustained for two seconds in accordance with AGMA standards without damage or permanent deformation.
- E. The allowable stress values used in the design shall be in accordance with the latest revisions of the specifications: AISC latest edition, AGMA 6034-B92 and AGMA 2001-B88, based upon 24 hour/day 20-year continuous usage. The drive shall be designed with the AGMA recommended service factor of 1.5.

- F. Interface with Adjacent System(s)
  - 1. CONTRACTOR shall install Thickener-Clarifier sludge collection equipment within each clarifier as per the Contract Drawings in coordination with the sludge collection equipment manufacturer.
  - 2. CONTRACTOR and sludge equipment manufacturer shall coordinate with Section 11201 to confirm that proper clearances are required between all components internal to the thickener/clarifiers, including but not limited to the trough/weir system, tube settlers, tube settler supports, influent piping, and rake arms.

#### 1.05 SUBMITTALS

- A. Submit shop drawings in accordance with Sections 01331 and 01620.
- B. Manufacturer's literature, illustrations, specifications and engineering data including dimensions, materials, size, weight, performance data and curves showing overall pump efficiencies, flow rate, head, speed and shut-off head.
- C. Submit operation and maintenance instructions in accordance with Section 01781.
- D. Fabrication, assembly, installation and schematic and point to point wiring diagrams.

#### 1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling and Unloading:
  - 1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete in ample time to prevent delay of that Work.
  - 2. Handle all equipment properly, in accordance with manufacturer's recommendations. Equipment, which is distorted or otherwise damaged, will not be acceptable. Protect all bolt threads and ends from damage.
- B. Storage and Protection:
  - 1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
  - 2. Store all mechanical equipment in covered storage off the ground and prevent condensation.
- C. Acceptance at Site:
  - 1. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace loss and repair damage to new condition in accordance with manufacturer's instructions.

#### 1.07 SPARE PARTS

- A. The following spare parts shall be furnished in clearly identifiable and labeled containers:
  - 1. One drive motor.
  - 2. One set of motor bearings.
  - 3. One set of ball bearings and strip liners (if required).
  - 4. Two sets of gaskets and seals of each type.
  - 5. One set of oil seals.
  - 6. One set of squeegees.
  - 7. Twelve shear pins.
  - 8. Other spare parts recommended by the manufacturer for the first year of operation.

1.08 WARRANTY

- A. Provide equipment warranty in accordance with the General Conditions, Supplementary Conditions, and Section 01620.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. The thickener/clarifier equipment manufacturer shall be the following, or approved equal:
1. WesTech.
  2. Siemens Water Technologies.
  3. Walker Process Equipment, A division of McNish Corporation.

2.02 EQUIPMENT DESIGN

- A. General
1. Corresponding parts of multiple units shall be interchangeable.
  2. No chains or sprockets shall be below the liquid surface or in contact with the liquid.
  3. Design of the center mechanism and drive unit shall permit continuous operation at the continuous torque rating without excessive wear and shall permit development of the maximum operating torque without damage to or failure of the mechanism and drive components.
- B. Schedule of Service Conditions
1. Number of Tanks (Thickener/Clarifiers): 2
  2. Tank Diameter: 24 ft.
  3. Side Water Depth: 12 ft.
  4. Freeboard Depth: 1 ft.
  5. Tank Bottom Slope: 2-3/4 inches in 12 inches, CONTRACTOR shall field verify the slope of the tank floor prior to the fabrication of any equipment.
  6. Types of Flow to Tanks: Filter Backwash and Coagulation Basin Blowdown
  7. Maximum Design Flow to Each Tank: 120 GPM
  8. Solids Loading Rate at Maximum Flow (per Tank): 4,500 dry pounds per day.
- C. The thickener shall be of the side feed and peripheral overflow type with a central driving mechanism, which shall support and rotate a torque tube with two rake arms and central scraper attached thereto. Peripheral or traction drive clarifiers are not acceptable. Rake blades attached to the rake arms shall be arranged to move the sludge that settles on the tank bottom to a sludge hopper near the center of the tank. The speed of the mechanism shall be within the range of 0.06 to 0.08 revolutions per minute. All structural steel shall have a minimum thickness of 1/4 inch, and stainless steel bolts shall have a minimum diameter of 1/2 inch.
- D. Torque Tube and Rake Arms - A steel torque tube shall be bolted to the final reduction gear and shall support two (2) structural steel rake arms. These sludge collecting arms shall be equipped with steel scraper blades set and spaced to scrape settled sludge from the tank bottom to a sludge hopper located at the center of the tank. They shall be attached to and rotated by the torque tube. The arms shall be fabricated of structural steel, with a minimum thickness of 1/4", and shall be adequately braced with struts and tie bars. Pickets shall be furnished for attachment to the scraper arms. The blades shall be so spaced that the entire tank bottom is scraped twice for each revolution of the mechanism.
1. Provide each rake arm with steel scraper flights and adjustable spring stainless steel squeegees. The rake blades shall have a minimum depth of 10 inches and shall be identical for each arm with the placement such that the entire tank bottom is scraped twice for each revolution. Steel scraper flights shall be slotted for vertical adjustment.

2. Rake blades shall have a length, which results in a 3-inch overlap of area swept by previous blade. Adjustable stainless steel squeegees shall be furnished for all the blades and they shall project 1-1/2 inches below the bottom of the blades and shall be fastened by 1/2-inch diameter stainless steel bolts and nuts.
  3. Rake arms shall be self-supporting and without tie rods. Provide adjustable bolts at top chord and heavy pins and yoke at bottom chord for vertical adjustment.
  4. Vertical steel pickets shall be attached to and spaced along the length of the rake arms so as to ensure proper thickening of the sludge. The minimum height of the pickets above the tank floor shall be 3 feet measured at the tank wall. The rake blades and pickets shall be fabricated of 1/4-inch minimum thickness steel. CONTRACTOR shall confirm picket height will not conflict with Tube Settler Support System.
  5. Rake arms shall be attached to and rotated by the torque tube.
  6. The rake arms shall be designed such that calculated stresses do not exceed the AISC allowable stress at twice the drive 100% rating.
- E. Influent Feedwell - An influent well, fabricated of 1/4-inch steel plate and supported from the walkway structure, shall be provided to diffuse the liquid into the tank without disturbance. The influent well shall be minimum 6 feet 3 inches in diameter and shall project a minimum of 3 feet 6 inches below the liquid level and shall include one flanged pipe nozzle for connection to the new 6-inch influent pipes; pipe location is shown on the Contract Drawings. Feedwell shall have energy dissipating inlets, for the 6-inch piping, as part of the influent feedwell design, (as shown on the Contract Drawings) to help decrease velocities into the feedwell.
- F. Influent Pipes – 6-inch diameter welded steel influent pipes, minimum 1/4" wall thickness. The pipe shall include a 125# Class ANSI steel flange for bolting to incoming influent line to the tank and feedwell spool pieces. The pipe shall include all necessary supports, as shown on the Contract Drawings.
- G. Center Drive Mechanism
1. The final reduction worm gear shall be a cut-tooth casting mounted on an anti-friction ball bearing assembly.
  2. The worm and worm shaft shall be as an integral unit and shall be heat treated AISI 4140 or 8620 steel or ASTM B427 bronze with the worm threads surface hardened and finish ground.
  3. The worm gear shall be one-piece ductile iron ASTM A53677 Grade 80-55-06 or centrifugally cast ASTM B427 bronze.
  4. Bearings supporting the worm, worm gear, and pinion shall be precision tapered roller bearings and shall operate in an oil bath.
  5. The bearing shall be mounted in a housing designed such that gears and bearings operate in an oil bath. The bottom and sides of the housing shall be a single casting or welded together into a single unit.
  6. A steel torque tube shall be bolted to the gear and supports and the scraper mechanism.
  7. The housing shall be provided with an extended journal type torque tube steady bearing to prevent tipping of the gear. The final reduction gear and the anti-friction ball bearings shall run in an oil bath within the final gear reduction housing. The housing shall be effectively sealed against contaminants. A readily accessible oil filling and level pipe with sight gauge shall be furnished.
  8. An overload device shall be mounted on the drive unit at the thrust end of the worm shaft and shall consist of: a compression spring or plate spring assembly, an indicator and dial, a minimum of two (2) microswitches, and a terminal block, all enclosed in a waterproof housing. These micro-switches will be used to indicate a high torque alarm and the shutdown of the Thickener-Clarifier equipment for overload protection. The switches shall be mounted in a NEMA 4X 304 stainless steel housing.
  9. The microswitches shall be factory set to 1) provide an output to the motor controls when the load on the mechanism reaches 85% of the AGMA rated torque capacity of the drive, and 2) to stop the motor, via an output to the motor controls, when the load reaches 100%

- of the AGMA rated torque capacity. Each switch shall be furnished with auxiliary contacts for connection to the existing alarm system.
10. A shear pin device, set for 130% of the AGMA rated torque, shall be furnished.
  11. A visual torque dial indicator shall be provided and oriented so it may be read from the walkway.
  12. Provide oil filling and level pipe along with a drain plug and sight gauge.
  13. Drive Unit
    - a. Motors and drives shall be furnished by the equipment manufacturer and shall be designed specifically for use with the equipment furnished.
    - b. Motor enclosures shall be TEFC, with a minimum service factor of 1.15, continuous severe duty, and suitable for outdoor operation. Motors shall have bearings with a minimum B10 rating of 200,000 hours. Each motor will be NEMA Design B employing Class F insulation designed for an ambient temperature of 40 degrees C. In addition to this Section, motors shall conform to the requirements of Section 15170.
    - c. The drive motor shall drive the intermediate gear assembly through a chain and sprocket, helical gear reducer, cycloidal speed reducer, spur gear, or other approved speed reducer assembly.
    - d. Gear head shall have AGMA Class II rating and AGMA rating plate shall be fastened to unit.
    - e. Motors shall be suitable for operation on 460 volt, 3 phase, 60 Hertz.
    - f. Motors shall be of adequate size so that there is no overload on the motor above rated nameplate horsepower under normal conditions of service, but not less than 0.50 horsepower.
  1. Design drive assembly for the following torques:
    - a. Continuous Operating Torque – 8,000 foot pounds.
    - b. Alarm Torque - 85% of AGMA rated torque.
    - c. Shut down Torque - 100% of AGMA rated torque.
    - d. Backup Shutdown Torque - 120% of AGMA rated torque.
    - e. Field Test Torque - 120% of AGMA rated torque.
    - f. Momentary Peak Torque – 16,000 ft-lbs.
- H. Trough/weir system- Thickener Clarifier No. 2.
1. Existing trough/weirs shall be reused.
  2. Existing trough/weirs shall be removed, sand blasted, and repainted prior to re-installation in accordance with Section 09900.
  3. Trough/weirs shall be installed with no more than 1/16 inch variation from the elevations indicated on the Contract Drawings.
- I. Trough/weir system- Refurbished Sludge Decant Tank
1. CONTRACTOR shall furnish and install new weirs in the refurbished Sludge Decant Tank in accordance with Section 11287.
- J. Reference Specification Section 11201 for details of Tube Settler System.
- K. Fasteners, anchor bolts, bolt studs, nuts, and washers shall be Type 304 stainless steel according to Section 05500. All stainless steel bolts shall have a minimum diameter of 1/2-inch.
- L. Existing tank cover beams, and walkway beam shall be removed, abrasive blasted, and repainted prior to re-installation in accordance with Section 09900.
- M. Access Bridge
1. The access walkway shall span the length of both Thickener-Clarifiers, as shown in the Contract Drawings.
  2. The access walkway shall be aluminum grating at least 3'-0" wide.
  3. The access walkway shall be designed for all dead loads applied to it plus a live load of 100 lb/ft. The live load shall not cause a deflection of more than 1/360 of the span.

4. The access walkway shall be constructed using a minimum of 3/16 inch thick structural shapes. The sides of the truss bridge may serve as railings, provided the top chord is 3'-6" above the walkway surface. Handrails shall be aluminum.
5. The access bridge shall be supported by two existing mechanical walkway support beams. The existing support beams are structurally supported by the tank walls.

## 2.03 CONTROLS

- A. Controls shall be as shown on the Electrical Drawings, specified in this section, and in full compliance with Division 16, Electrical Specifications and Division 17, Instrumentation.

## PART 3 EXECUTION

### 3.01 INSPECTION

- A. CONTRACTOR shall verify that structures, pipes and equipment are compatible.
- B. Make adjustments required to place system in proper operating condition.

### 3.02 INSTALLATION

- A. Install the equipment in accordance with the instructions of the manufacturer and Section 01620. Field welding of manufacturer's equipment shall not be permitted.
- B. Manufacturer's representative shall check and approve the installation prior to operation. Manufacturer's representative shall field test and calibrate the equipment to assure that the system operated to the OWNER'S satisfaction.
- C. Furnish and install all required oil and grease for initial operation. Grades of oil and grease shall be in accordance with the recommendations of the equipment manufacturer.
- D. New 1-inch grout layer shall be installed/grouted prior to startup.
- E. The interior and exterior of the Thickener-Clarifier Sludge Collection Equipment shall be sandblasted, primed and repainted prior to startup.

### 3.03 PAINTING

- A. Surface preparation, shop painting, field painting, and other pertinent detailed painting specifications shall be in accordance with Section 02669 and Section 09900.
- B. Collectors, motors, frames, ferrous metal surfaces, appurtenances, etc., shall receive shop primer conforming to the requirements of Section 02669 and Section 09900.
- C. All gears, bearing surfaces, machined surfaces and other surfaces which are to remain unpainted shall receive a heavy application of grease or other rust-resistant coating. This coating shall be maintained during storage and until the equipment is placed into operation.
- D. CONTRACTOR shall certify, in writing, that the shop primer and finish coating system conform to the requirements of Section 02669 and Section 09900.



### 3.04 EQUIPMENT TESTING

- A. Shop Tests:
  - 1. Perform tests, trials, torque testing, and initial operation on the gravity thickener equipment as set forth in Section 01620.
  - 2. The complete center drive mechanism shall be tested in the manufacturer's shop to assure quality, to calibrate the drive control, and to verify the drive is running properly prior to shipment.
    - a. A complete shop inspection test report shall be sent to the ENGINEER verifying that the drive meets the quality assurance requirements of the manufacturer and Engineer. Report shall be signed by individual responsible for testing and shall be submitted prior to shipping.
- B. Field Tests - Perform tests, trials, torque testing, and initial operation on the final settling equipment as set forth in Section 01620.
  - 1. Final field tests shall be made after the unit has been installed and ready for operation. The final field test shall be made by the CONTRACTOR in the presence of a representative of the equipment manufacturer and shall demonstrate:
    - a. Proper installation and proper alignment of the units.
    - b. Proper operation without overheating or overloading of any parts and without objectionable vibration.
    - c. No mechanical defects in any of the parts.
    - d. Operation in the manner intended in accordance with the Contract Documents.
    - e. Structural soundness of the equipment.
    - f. Proper operation of the warning and shutdown circuitry.
  - 2. Static Torque Test
    - a. The clarifier mechanism shall be field torque tested. The purpose of the torque test is to verify the structural integrity of the mechanism and center drive unit. The testing shall be carried out under the supervision of the equipment manufacturer's representative before the mechanisms are accepted and placed into operation.
    - b. The torque test shall consist of securing the rake arms by cables to anchor bolts installed by the contractor in the tank floor at locations specified by the equipment manufacturer. A load shall be applied to the scraper arm by means of a ratchet lever and cylinder connected to the cable assembly. Do not apply loads by means of the drive motors. Use a dynamometer attached between the cable and the anchor bolts to measure the torque applied.
    - c. Take and record torque readings at 25, 50, 100, and 120 percent of the drive design torque.
    - d. The manufacturer's service representative shall verify that the alarm, motor cut-out, and backup safety motor cut-out switches are properly set and are in proper operation to protect the clarifier mechanism as specified. Adjust setpoints as necessary to match the torque reading. Repeat the test procedure at least three times for each alarm setpoint verification. The unit will pass this portion of the torque test if the alarm indication points can be verified within 5 percent variation over three continuous test loadings.
  - 3. Dynamic Torque Test
    - a. After completion of the static torque test, a dynamic test is to be performed to test the operation of the alarm annunciation and motor cut-out switches. The drive control torque cut-out switch must be verified as operational before conducting this test. The test must be conducted by the manufacturer's field representative.
    - b. Load static test cables equally at 200-lb. load and then back off machine to allow 3 feet of arm rotation before arms begin loading. Cable lengths must not be altered after this step in order to provide equal loading to arms.
    - c. Start machine and allow the arms to load up test cables. Let the mechanism run until the drive control torque cut-out switch is activated and shuts the machine down. Note both the alarm and motor cut-out setpoints.
    - d. Back off the arms by letting off evenly on the test cables.

4. Operation Tests - The mechanism shall be operated in a dry tank for a minimum of six continuous hours before flow is allowed to enter the system. There shall be no binding, jerky, or unusual motion exhibited during this run in period. Motor amperage shall be checked at least hourly for any unusual or higher than normal figures. After the unit has successfully passed this initial test, flow shall be introduced into the tank and the same six-hour observation test run. If the unit should fail under any of these conditions, the test shall be halted and the problem corrected. If, after several attempts, the unit does not successfully pass the field test, the faulty portion of the equipment shall be replaced and the test re-run.
5. All equipment required for the test shall be provided by the manufacturer. After the successful test the equipment shall be returned to the equipment manufacturer.

### 3.05 SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. The CONTRACTOR shall arrange for the equipment manufacturer to furnish the services of a qualified representative in accordance with Section 01620.
- B. A written report covering the representative's findings and installation approval shall be mailed directly to the ENGINEER covering all inspections and outlining in detail any deficiencies noted.

END OF SECTION

## SECTION 11350

### BELT FILTER PRESS

#### PART 1 GENERAL

##### 1.01. DESCRIPTION OF WORK

- A. Furnish, install, and make ready to operate, two complete 1.5-m three-belt sludge dewatering systems (BFP-1, BFP-2) consisting of:
1. In-line static mixer and polymer injection ring.
  2. Distribution system.
  3. Gravity drainage section.
  4. Wedge section.
  5. Pressure section.
  6. Belt tracking system.
  7. Belt tensioning system.
  8. Belt wash system.
  9. Polymer feed system (PS-2).
  10. Washwater booster pump.
  11. Custom discharge chute.
  12. Controls to include, but not be limited to:
    - a. Programmable logic controllers (PLCs) and associated hardware and software.
    - b. PLC programming.
    - c. One licensed copy of PLC and PLC human-machine interface (HMI) software as required to program the supplied PLC and PLC HMI.
  13. All necessary accessories in compliance with the following specifications and as shown on the Contract Drawings.
- B. The BFP supplier shall be responsible for supplying the BFP specified under this specification as part of the complete BFP system shown on the Contract Drawings. The BFP shall operate as a complete dewatering system with the Thickened Sludge Pumps specified under Section 11320 and with all associated equipment, including but not limited to, polymer feed system (PS-2) and dewatered sludge pumps. The complete dewatering system shall fully comply with the performance requirements specified under all sections.
- C. The Belt Filter Press supplier shall provide a polymer system (PS-2) in accordance with Section 11350.

- D. The system must be complete and operational with motors, drives, controls, instrumentation, and accessories as required to provide a complete and operable system as specified herein and shown on the Contract Drawings.
- E. Provide all pipe and pipe fittings necessary to connect the supplied equipment as shown on the Drawings.

#### 1.02. RELATED SECTIONS

The specifications listed below are an integral part of this equipment specification. The Contractor shall provide all of the listed sections to the equipment suppliers.

- A. Section 01100 - SUMMARY OF WORK.
- B. Section 01330 - SUBMITTALS.
- C. Section 01400 - QUALITY CONTROL.
- D. Section 01620 - EQUIPMENT-GENERAL.
- E. Section 01650 - STARTUP OF SYSTEMS.
- F. Section 01821 - INSTRUCTIONS OF OPERATIONS AND MAINTENANCE PERSONNEL.
- G. Section 05500 - MISCELLANEOUS FABRICATIONS.
- H. Section 09900 - PAINTING.
- I. Section 11210 - POLYMER FEED SYSTEM.
- J. Section 11300 - PUMPING EQUIPMENT-GENERAL.
- K. Section 11320 - THICKENED SLUDGE PUMPS.
- L. Section 15060 - INSIDE PROCESS PIPING.
- M. Section 15170 - MOTORS.
- N. Section 16161 - CONTROL PANELS AND ENCLOSURES.
- O. Section 16480- VARIABLE FREQUENCY DRIVES.
- P. Section 16484 - CONTACTORS AND MOTOR STARTING EQUIPMENT.
- Q. All electrical equipment and wiring shall be in full conformance with Division 16, Electrical Specifications.

#### 1.03. PERFORMANCE REQUIREMENTS

- A. General - The sludge dewatering system shall be capable of continuously dewatering water treatment plant residuals, consisting of settled solids collected in the Coagulation Basins and Filter Backwash. Sludge shall be fed to the BFP from the thickened sludge pumps provided under Section 11320. The press shall effectively accomplish solids-liquid separation to produce a dewatered sludge cake. Dewatered sludge shall be continuously discharged from the BFP to the roll-off containers provided by Modern Disposal Services.

- B. The BFP system shall be capable of operation under all of the following conditions:

Parameter	Value
Sludge Source	Thickened residuals obtained from the coagulation basin blowdown and filter backwash processes. Residuals are conditioned with Polyaluminum Chloride. Residuals shall be conveyed from the Thickener-Clarifiers to the BFP system by the Thickened Sludge Pumps.
Number of installed belt filter presses	2
Feed sludge dry solids concentration	0.5 to 6.0% by weight
Effective belt width	1.5 meters
Hydraulic throughput capacity (Per BFP)	150 gpm at 3% solids
Design Loading Rate (Per BFP)	1,250 dry lbs./hour
Minimum discharge dry solids concentration	24.0%
Minimum solids capture	95%
Maximum polymer usage	25 lbs./dry ton of solids (active basis)
Maximum utility water demand	90 gpm
Available utility water pressure	50 psig

- C. Sludge conditioning will be provided by the polymer feed system (PS-2) provided by the BFP manufacturer. The maximum polymer dosage rate indicated is based on pounds of active polymer. No other chemical addition shall be required to meet the performance requirements listed herein.
- D. The available utility water pressure represents the typical pressure of the plant water system at the plant, which will be used to supply wash water to the belt filter press system as shown on the Contract Drawings. The belt filter press manufacturer is responsible for providing booster pumps as necessary to increase the wash water pressure from the given pressure for the plant water system to the pressure required for proper operation of the belt filter press system.
- E. Performance Test - 2-week performance test is required for each Belt Filter Press in accordance with Section 01751.

#### 1.04. SUBMITTALS

- A. Submit under provisions of Section 01330.
- B. Shop drawings for all equipment supplied under this section in accordance with Sections 01330 and 01620. A block diagram showing all electrical connections between system components, including but not limited to, BFP, thickened sludge pumps, booster pumps, hydraulic system, polymer feed system (PS-2), and all associated variable frequency drives (VFDs and motor starters), remote lights and controls, and evidence of dewatering belt suitability shall be furnished with the shop drawings.
- C. Performance Affidavit - A performance affidavit is required for all equipment specified in this section in accordance with Section 01620.
- D. Operation and Maintenance Instructions - Complete operation and maintenance instructions shall be supplied in accordance with Section 01620.
- E. Wiring Diagrams - Complete wiring diagrams for the belt press control panel. Diagrams shall show all electrical components within the panel and show wire color and numbering and terminal numbering as provided in the panel.

- F. Submit manufacturer's installation instructions, certifications, and test results in accordance with Section 01620.
- G. Provide fully documented hard copy and disc copy of final, debugged PLC program, in accordance with programming software.
- H. Record Drawings - Submit complete as-built wiring diagrams for control panel. Diagrams shall show all components within panel, show wire color and terminal numbers as labeled in the installed control panel.
- I. Shop drawing submittal shall include product information for the in-line static mixer, including headloss values at minimum and maximum arm settings.
- J. Platform design shall be prepared by a Professional Engineer licensed to practice in New York State. Submit stamped calculations and drawings for platform and supporting structure.
- K. Submit proposed screen shots of HMI graphical screens.

#### 1.05. SPARE PARTS

- A. Spare parts, which are identical to and interchangeable with the original parts, shall be furnished in clearly identified containers.
- B. The following spare parts shall be provided for the BFP:
  - 1. One complete set of belts.
  - 2. One set of discharge blades.
  - 3. One roller bearings of each type and size.
  - 4. One cleaning brush for nozzles.
  - 5. Five bulbs of each type of indicating light and alarm light.
  - 6. Five fuses of each size and type.
  - 7. Two relays of each size and type.
  - 8. One limit switches of each size and type.
  - 9. One set of seals for each inlet distributor, belt wash station, and wedge section.
  - 10. Twenty spray wash nozzles.
  - 11. Five standardized grease fittings.
  - 12. One set of hydraulic filters.

#### 1.06. SCADA SYSTEM COORDINATION - ALL CONTRACTS

- A. The BFP PLC, control panels, and associated programming provided in this section shall be supplied by the manufacturer of the BFP.
- B. PLCs shall be provided by Schneider Electric M340. No substitutions will be accepted.

- C. PLC HMIs shall be provided by Schneider Electric - Proface. No substitutions will be accepted.
- D. The CONTRACTOR shall furnish and install PLC enclosures, complete with all necessary accessories and PLC programming software, wired to accommodate all inputs and outputs as specified in Section 17100, ready to communicate via the specified medium(s), and ready to be programmed.
- E. PLCs shall be provided in accordance with Section 17100. PLC hardware and appurtenances shall meet specifications of Section 17100 excluding installed spares and uninstalled spare equipment.
  - 1. Coordinate the compatibility of the hardware, software, and programming with the proposed SCADA system. Coordination shall include, but not be limited to:
    - a. Programs effectively address all of the requirements of the system for control, display, and operation.
    - b. Equipment will execute the programs to obtain the intended operation.
- F. User-defined set points and memory register data (state RAM) shall be stored in non-volatile memory areas of the PLC.
  - 1. Analog data shall be scaled, stored, and continuously updated in PLC floating point/real registers for access by the SCADA system programmer. Integer registers may only be used for totalizers and runtimes.
  - 2. PLC supplier is responsible for providing all necessary hardware, software, drivers, programming and the like required to network to all PLCs, the SCADA workstations, and the supervisory software attached to the Ethernet IP network.
  - 3. Verify that the appropriate signals and signal scaling are available to control the processes as specified.
  - 4. Make changes in programming to provide the intended operation.
  - 5. Coordinate input/output (I/O) states accordingly:
    - a. Communicate normal state of I/O contacts with the supervisory software programmer.
    - b. Communicate whether I/O contacts to and from equipment are momentary or maintained.
    - c. Communicate the type, zero, and span for analog signals.
  - 6. Make changes in supplied programming to provide the intended operation and eliminate nuisance alarming.
  - 7. Coordinate demonstration with the General Contractor and with Owner and Engineer. Request for demonstration date shall be in writing no less than two weeks in advance of the proposed date.
  - 8. Provide SCADA system programmer access, through the SCADA system network, to all register values in any PLC supplied under this section. Coordinate Ethernet IP addressing for all PLC with the SCADA system programmer.

9. Provide SCADA system programmer a list of each PLC database including:
  - a. Tag name.
  - b. Tag description.
  - c. PLC I/O address.
  - d. Engineering units.
  - e. Signal scaling.
10. Provide the SCADA system programmer with the latest hardware interfaces and I/O drivers required for the supervisory software to fully communicate with the Contractor's supplied PLC.

#### 1.07. SCADA SYSTEM COORDINATION - BELT FILTER PRESS PLC PROGRAMMER

- A. Belt filter press PLC and PLC HMI programming shall be provided by the Manufacturer.
  1. Submit shop drawings and product information for PLC, control panel, and software in accordance with requirements in Sections 17100. All submissions shall follow the same order and format as described. This shall apply to submittals for:
    - a. Shop drawings.
    - b. Operations and maintenance data.
    - c. Record drawings.
  2. Provide programming to meet the specified operational and functional requirements specified herein.

### PART 2 MATERIALS

#### 2.01. MANUFACTURERS

- A. The BFP manufacturer shall be the following or equal:
  1. BDP Industries, Inc.
  2. Komline-Sanderson.
  3. Or approved equal.

#### 2.02. EQUIPMENT DESIGN

- A. General
  1. The BFP shall be a complete manufacturer-integrated high-efficiency system consisting of a fabricated structural frame or a fabricated structural tubular frame with machined bearing pads, in-line static mixer, distribution chamber, independent gravity section, wedge section, pressure section, belt wash stations, drainage system, belt tracking and tensioning system, complete with hydraulic system.



2. Overall dimensions of the BFP including frame, rolls, drives, distribution chambers, valves, flanges, and all equipment and appurtenances attached to belt press frame shall not exceed 22 feet 7 inches long by 9 feet 8 inch wide by 9 feet 10 inches high.
  3. No disassembled component, excluding the belt filter frame, shall weigh more than 4,000 lbs. Lifting lugs shall be provided as necessary to afford convenient access to maintenance points throughout the belt filter. All wiring on the press shall be contained in PVC conduit, fittings and enclosures.
  4. The BFP pumps and controls shall be located in a right-handed configuration to allow for easy maintenance.
- B. Delivery, Storage, Handling - All equipment and components shall be furnished as complete assemblies with all internal wiring, piping, valving, and control devices. Items shall be delivered as complete assemblies except where partial disassembly is required by transportation regulations or for protection of components. Dewatering belts shall be shipped separately in suitable containers to protect them from accidental damage.
- C. Materials
1. All components of the BFP shall be engineered for long, continuous, and uninterrupted service. Provisions shall be made for easy lubrication, adjustment, or replacement of all parts.
  2. All structural steel shall conform to the ASTM Standard Specifications for Structural Steel, Designation A36. All iron castings shall conform to the ASTM Standard Specification for Gray Iron Castings, Designation A48. All welding shall be in accordance with the latest applicable codes of the American Welding Society.
  3. All materials in contact with polyelectrolyte or sludge shall be of stainless steel. All fasteners, pins, and anchor bolts shall be Type 316 stainless steel. All hydraulic lines shall be constructed of Type 316 stainless steel tubing. Flexible lines to cylinders, low-pressure connections to the reservoir, etc. shall be hose of the material and construction appropriate to the application. All other stainless steel materials shall be Type 304. Except as otherwise specified, steel plates and shapes shall have a minimum thickness of 1/4-inch and bolts a minimum diameter of 1/2 inch.
- D. Design Load Definition - The design load mentioned throughout this specification shall be based on the summation of all forces applied to the particular BFP component under discussion. These forces shall include, but not be limited to, roller weight, belt tension and shear forces, and friction forces. The design load shall occur under maximum loading conditions at the maximum belt speed. Load calculations shall be submitted to the Engineer upon request.
- E. Structural Frame
1. The BFP frame shall be made of structural tubular steel or I-beam channel steel. Frame members shall be welded or bolted together to form an integral unit. The frame shall be rigid and adequately braced to prevent deflection and vibration.
  2. The tubular steel in the pressure section frame steel shall have a minimum thickness of 3/8-inch. The maximum loading on any frame member shall be less than 1/10 of the yield strength of the steel. The frame shall provide support for press bearings and insure absolute plane parallelism of all rolling elements.
  3. The fabricated steel frame shall be designed to withstand the maximum stresses imposed on the individual members with a safety factor of 10. Specifically, the maximum actual stress on

any member, connection, plate, etc., shall not exceed 1/10 of the yield strength of the frame material used. The deflection ratio of any structural member shall not exceed L/600 where L is the member span. The tension used for the calculations shall be at least 70 lbs. per linear inch of actual belt width.

4. After fabrication, all frame members shall be hot dipped galvanized per ASTM A123 to a thickness of 5 to 7 mils for complete corrosion protection.
5. The frame shall be designed to be installed on a concrete foundation. The frame shall be secured to the foundation with anchor bolts. Frame construction shall allow for easy access and visual contact with all internal components of the BFP.

F. In-Line Static Mixer

1. Each BFP shall be supplied with a 316 stainless steel in-line static mixer to blend the sludge with polymer. The static mixer shall be located on the sludge feed line leading to the belt press. The static mixer shall consist of a polymer injection ring, venturi mixing valve(s), polymer injection manifold complete with tubing and fittings for distributing polymer to the injection points on the ring, and transition pieces for connection to the sludge feed line. The injection ring shall include four injectors arranged tangentially around the sludge feed line. The dual mixing valve shall consist of an internal flap connected to an external adjustable, weighted arm. The arm setting shall determine the amount of flow area through the mixer venturi.
2. The Contractor shall install two new complete in-line static mixers along the new sludge line as recommended by the BFP manufacturer.
3. At two other locations along the new sludge line determined by the BFP manufacturer, the Contractor shall install two spool pieces. The spool pieces' dimensions and connections must allow the relocation of the static mixer from its initial placement.
4. The location of the four in-line static mixers must allow enough room for easy removal and installation of the spool pieces, mixing valve and its weighted arm.
5. Distribution System - Provide inlet distribution chamber with sufficient capacity for all sludge conditioning to be completed before any sludge is fed onto the BFP. For draining, the distribution chamber shall have a PVC ball valve, full port type. Minimum valve diameter shall be 3 inches.
6. The press shall be furnished with an independent gravity drainage area consisting of a variable speed belt designed to contain and drain conditioned sludge. The inlet distributor shall be utilized to evenly distribute the conditioned sludge over the face of the moving filter belt. The inlet shall incorporate a variable speed, 6-blade paddle wheel distributor across the full width of the belt press. The feed distributor must form a uniform slurry depth over the full belt width immediately upon leaving the feed distributor of plus or minus 1/16 inch. The paddle wheel shall be driven by a 1/3 HP AC TEFC variable speed motor and gearbox. The belt system shall be sealed to prevent leakage and shall be easily accessible for operating, viewing, cleaning, and adjusting.

G. Gravity Drainage Section

1. The BFP shall have a gravity drainage section with a minimum active dewatering area of 48 square feet. Belt speed and tension through the gravity drainage section shall be adjustable (see Article 2.04).

2. The filter belt in the gravity drainage section shall be supported by a system of bars across the belt width. The bars shall be spaced apart along the entire length of the gravity drainage section. The bars shall be made of HDMW polyethylene. The bars shall be supported by 1/4-inch by 3-inch 304 stainless steel bars.
3. The BFP shall have a minimum of 8 rows of plows, a total of 84 chicanes minimum in the gravity drainage section for directing sludge flow onto the filter belt. The vertical and horizontal position of each plow shall be individually adjustable. Each row shall include a lifting handle capable of lifting the row of plows out of the sludge flow at one time. The plows shall be made of HDMW polyethylene. All plow mounting and lifting handle equipment shall be made of stainless steel.
4. The gravity drainage section shall include stainless steel side barriers with replaceable rubber seals to contain sludge flow on the filter belt. The gravity drainage section shall incorporate an adjustable hydraulic tensioning system. Mechanical tensioning systems are not acceptable.
5. The gravity drainage section shall be mounted at operator level. If the gravity drainage section height is more than 5 feet, the BFP manufacturer shall supply a platform around all sides of the gravity deck as specified in paragraph 2.03.D of this specification at no additional cost.

#### H. Wedge Section

1. The BFP shall have a separate and distinct wedge section with a minimum active dewatering area of 21.7 square feet figured on the basis of one belt. The wedge section shall accept thickened sludge from the gravity drainage section and direct it into the pressure section.
2. As sludge moves through the wedge section, it shall be compressed by the pressure section belts.
3. Wedge zone shall be curved and constructed of Type 316 stainless steel.

#### I. Pressure Section

1. The BFP shall have a separate and distinct pressure section with a minimum active dewatering area of 180 square feet (90 square feet based on one belt) based on the effective dewatering area in the shear pressure zone (the area of curved grid and rollers in contact with the belts, i.e. full width of the belt). Sludge dewatering in the pressure section shall be the result of shear and compression forces acting on internal sludge water. The pressure section shall consist of a minimum of eight rollers and two belts.
2. Sludge in the pressure section shall travel in an "S" shaped pattern, over and under the rollers. As the sludge moves through the rollers, it shall alternately be compressed and then allowed to expand. The filter pressure belts shall travel in opposite directions causing the sludge to shear. The pressure section filtrate shall be collected by Type 304 stainless steel drip pans that eliminate cake rewetting and direct filtrate into the discharge piping.
3. Belt speed and tension through the pressure section shall be adjustable (see Article 2.04). A low volume, high pressure, self-contained wash station shall be included after the pressure section for each of the filter belts. Rollers in the pressure section shall be accessible from outside of the press frame for repair and maintenance purposes.
4. The pressure section shall provide a minimum of 210 degrees of wrap and eliminates cake rewetting present in horizontal pressure sections.

5. The first roll shall be a minimum 24-inch diameter, perforated roll, constructed of 304L stainless steel and shall have provisions to avoid pooling of filtrate in the bottom of the roll.
  6. The remaining rollers shall be a solid shell construction. The second roll diameter shall be a minimum 16 inches in diameter and the third shall be 12 inches in diameter. The remaining rollers shall be 5 x 10 inches in diameter. The decreasing roll diameter is to provide an increasing pressure profile in the pressure zone, made adjustable by changing the belt tension.
  7. The shell construction of all solid rolls shall be manufactured from ASTM A53 steel. All rolls shall be designed for a maximum center span deflection of 0.05 inches at 70 lbs. per linear inch (pli) belt tension.
  8. The minimum bearing size in the press section shall be 60 mm in diameter and the ends of each shaft on the rollers shall be equipped with support bearings as specified under bearings.
- J. Discharge Blades - Discharge blades shall be provided to separate the dewatered sludge from the discharge rollers. Blades shall be adjustable and beveled at each end. Each discharge blade shall be easily removable for replacement when required and fully accessible. Discharge blades shall be of high-density polyethylene or polypropylene.
- K. Belt Tracking System
1. Each belt shall be provided with an automatic hydraulic tracking system. The tracking system shall provide continuous adjustment of belt position on press rollers in order to maintain correct belt alignment. Each belt tracking system shall include a sensing arm(s), pilot valve(s), and a cylinder-operated adjustable steering roller. All tracking system components shall be hydraulically driven.
  2. The sensing arm(s) of the tracking system shall be in continuous contact with the belt edge. When a belt becomes misaligned, the sensing arm(s) shall send a signal to a pilot valve(s). The pilot valve shall in turn activate a control cylinder. The control cylinder shall cause the steering roller to change position until the belt is correctly aligned.
  3. All belt tracking system components shall operate with smooth and slow motions resulting in a minimum of belt travel from side to side. Limit switches shall be included in the belt tracking systems to protect against gross belt misalignment. Each tracking system shall contain two switches. One limit switch shall be placed on each side of a belt. The limit switches shall cause automatic and instantaneous shutdown of belt drives and sound an alarm upon tracking system failure. The limit switches shall be corrosion resistant.
  4. Manual tension and tracking in the GBT section shall not be accepted.
- L. Belt Tensioning Systems
1. Each belt shall be provided with an automatic belt tensioning system. The belt tensioning system shall be hydraulically driven. The system design shall be such that the dewatering pressure on the sludge is directly proportional to belt tension. Belt tension adjustment shall result in an immediate change in dewatering pressure.
  2. Each belt shall have a separate tensioning system furnished with an independent control station for adjustment of belt tension. Belt tension shall be adjustable from 0 to 70 pli.
  3. Each control station shall have a belt tension indicator meter. The meter shall correlate belt tension with hydraulic pressure.

4. Each belt shall have one tension roller. The roller shall be positioned by hydraulic cylinders to maintain the desired belt tension. Belt tension shall be maintained at a constant level regardless of process changes.
5. The belt tensioning system shall include sensing devices that shall cause automatic and instantaneous shutdown of belt drives and sound an alarm in the case of belt tensioning system failure.
6. The design of the belt tensioning system shall insure parallel movement of the tensioning cylinders. The tensioning roller shall be mounted on a rugged rack and pinion assembly, with hydraulic cylinders at each end for the gravity section. Plastic components will not be accepted. The belt tensioning system shall accommodate a minimum of 2.5 percent increase in belt length.

#### M. Belts

1. The BFP belts shall be made of wear-resistant monofilament polyester. Belt ends shall be joined with an ANSI 316 stainless steel clipper seam. A polyurethane or plastic coating shall be applied on belt seam to provide a smooth seam surface. Belt edges shall be heat sealed and bonded to protect against belt wear.
2. All belts shall have drive, tensioning, and tracking rollers. The minimum effective width of all belts shall be 1.5 meters. Minimum belt life shall be 2,000 hours of continuous operation at design conditions. The minimum tensile strength of all belts and seams shall be five times the maximum dynamic tension to which a belt shall be exposed. The belt seam shall be designed to fail before belt material when under tension.
3. Belt porosity and mesh design shall allow for optimum sludge dewatering and to prevent belt blinding. Pressure belts shall be of low porosity, designed for compression dewatering.
4. Belt selection shall be based on the manufacturer's experience. All belts shall have been used successfully by the manufacturer on similar sludges using similar polyelectrolyte conditioning chemicals. The manufacturer shall submit evidence of belt suitability with the shop drawings.
5. All belts shall be designed for ease of replacement with a minimum of press downtime. Belt replacement shall not require disassembly of the filter press.

#### N. Rollers

1. All rollers shall be made of carbon steel or stainless steel. Rollers shall have either double plate stub end, or forged end rollers, or through shafts. Stub end shafts shall be welded to the roller end plates. Idler rollers, large diameter press rollers, or drive rollers shall have minimum 3/8-inch thick roller bodies. The minimum end plate thickness shall be 1/2 inch. Perforated rollers shall be 304L stainless steel.
2. Deflection over the full length of all rollers shall not exceed 0.05 inches when the roller is under maximum design load of 70 pli. Rollers shall be designed to handle stresses in excess of two times the endurance limit of roller materials and welded connections when subject to belt tension of 70 pli, or five times the bending stress.
3. All calculations for roller deflection and bearing load shall be calculated using a belt tension of 70 pli.

4. Carbon steel rollers shall be covered with vulcanized Buna-N-rubber, or nylon for corrosion protection. The minimum rubber coating thickness shall be 3/16 inch. The minimum nylon coating shall be 25 mil. All coatings shall have a minimum Shore "A" hardness rating of between 55 and 65.

O. Bearings

1. All rollers shall be equipped with industrial, continuous duty, spherical double row roller bearings. All bearings shall be self-aligning and mounted in cast iron, split case, closed end housings with a machined bearing pad.
2. The design load on a bearing shall not exceed 25 percent of the bearing's "C" rating. All bearings shall have a minimum L-10 life of 1,000,000 hours at 70 pli and 15 ft/min. Maximum roller shaft speed and design loading shall be used in the calculation of the minimum L-10 life.
3. All bearings shall be designed for use in a drop in triple tech seal for "wet" environment. Bearings shall incorporate lip contact seals, labyrinth seals, and other devices to prevent dirt and water intrusion into a bearing.
4. All split case bearing housings shall be mounted on the press frame with a minimum of four bolts. All roller bearings and housings shall be by the following:
  - a. FMC Corporation, Link Belt Division, Indianapolis, IN.
  - b. SKF Industries, Philadelphia, PA: Rexnord, Downer's Grove, IL.
  - c. Or approved equal.

P. Belt Wash System

1. A belt wash system shall be furnished within each belt loop. The belt wash station shall consist of a minimum of one spray pipe fitted with non-clog nozzles. Nozzle spacing and spray pattern shall be such that the sprays from adjacent nozzles overlap one another at the belt surface. The spray pipe and nozzles shall be of stainless steel construction. Individual nozzles shall be removable.
2. The wash water supply pipe and nozzle assembly shall be housed in a manner that limits the spray pattern to within the wash station. The housing and nozzle assembly shall be readily removable. The housing shall be fabricated from stainless steel and include replaceable seals above and below the belt at both the exit and entrance to prevent the escape of spray mist.
3. The belt wash station shall be positioned such that the washing is performed after the cake has been discharged from the belt. The belt wash station shall extend over the full width of the filter belt by a minimum of 2 inches. No blinding shall occur when the belt is cleaned at the wash station.
4. The belt wash system shall use plant effluent water and be designed to operate at a maximum flow of 90 gpm at a pressure of 120 psig.
5. The belt wash station shall be furnished with an external handwheel that, when rotated, shall cause the brush bristles to enter each spray nozzle and clean out any solid particles, which have accumulated.
6. Belt wash station shall be the type manufactured by Appleton Manufacturing, Sprayco, or equal. All wash station components shall be made of AISI Type 304 stainless steel.

- Q. Drainage Pans - Drainage pans shall be supplied to contain all filtrate and wash water within the BFP and to prevent rewetting of downstream cake. Filtrate and wash water pans shall be constructed of AISI Type 304 stainless steel or 1/4-inch thick FRP and shall be piped separately to the drainage basin. All drain piping shall be Schedule 40 PVC, adequately sized for the intended service and rigidly attached to the press frame. Drain connections shall be self venting to prevent overflow. Flushing connections or similar provisions shall be provided for easy access during cleaning. Drainage pans shall be located such that the moving belts do not come into contact with the pans under any conditions.
- R. Washwater Booster Pump - One horizontal end suction wash water booster pump shall be provided by the BFP manufacturer for each BFP, for a total of two pumps. The booster pump shall be rated at sufficient capacity and discharge head to meet the wash water requirements of each BFP. The suction line of the booster pump shall be connected to the effluent water system, which will operate at a pressure of approximately 80 to 130 psig. The equipment supplier shall verify operating pressures of effluent water system with Contractor. The booster pump shall be furnished with a common steel channel base for the motor, pump, and coupling guard. The booster pump motor shall be totally enclosed fan cooled (TEFC) and shall be sized to meet the requirements specified in Section 15170 and shall be a maximum 15 HP and suitable for 460 volt, 3 phase, 60 Hertz power. The booster pump shall meet the requirements of Section 15400. All controls necessary to provide a complete and operating system shall be provided for the wash water booster pump including controls from the BFP control panel as specified herein. Provide all necessary support and wiring interconnects.
- S. Anchor Bolts - All anchor bolts and nuts and other fasteners furnished for the connection of the equipment, and other miscellaneous items to the concrete structure of concrete base pads shall be of AISI Type 316 stainless steel furnished by the equipment manufacturer, and shall be of ample size and strength for the purpose intended. Anchor bolts shall be epoxy grout type.
- T. Hydraulic System
1. The belt press shall have a separate hydraulic system. The manufacturer shall furnish and install one hydraulic system. The system shall include an electric motor, variable displacement vane pump, 20-gallon 304 stainless steel reservoir, high pressure filter, low pressure return filter, directional and flow control valves, pressure gauges, level gauge, temperature gauge and all necessary piping and fittings. The hydraulic system shall operate on 460 volt, 60 Hertz, 3-phase power supplied from the BFP control panel. The electric motor shall be 2 HP and shall meet the requirements of Section 15170.
  2. All piping shall lead to a manifold located on the hydraulic pump. A low hydraulic corrosion-resistant pressure switch shall shut down the belt press and activate an alarm on the belt press control panel upon loss of hydraulic pressure.
  3. The manufacturer shall provide all equipment necessary to make the hydraulic system complete and operable. All hydraulic lines shall be rigidly supported on the structural frame and be properly sized for the intended use with adequate factors of safety for the pressure rating. All hydraulic piping shall terminate at a single inlet connection mounted on the press frame.
  4. All hydraulic system valves shall be stainless steel.
  5. Hydraulic system cylinders shall be fabricated of composite material with stainless steel hardware and 316 stainless steel rods.
  6. Hydraulic system shall be installed by Contractor at the location shown on the Contract Drawings.



U. Hydraulic Piping

1. The BFP manufacturer shall design the welded stainless steel piping between the hydraulic unit and the BFP. The piping system shall be designed to withstand 1.5 times the maximum internal fluid pressure or twice the working pressure, whichever is greater.
2. Piping system to be furnished and installed by the Contractor.

- V. Discharge Chute - The discharge chute shall be designed specifically for the approved BFP and shall be compatible with the building layout and sections shown on the Contract Drawings. The discharge chute shall be welded construction, fabricated from minimum 12-gauge Type 304 stainless steel. Each chute shall be designed to accommodate at 15-CY rolloff container below.

2.03. ACCESSORIES

- A. Pressure Gauges - Pressure gauges shall be furnished and installed on the wash water booster pump and on the hydraulic unit in accordance with Section 15400. Gauges shall be installed with a manufacturer's standard pulsation dampener and shutoff valve. The ranges of the gauges shall be suitable for any range of pressure that can occur during operation.
- B. Solenoid valves or motorized ball valves shall be furnished and installed on the wash water and air supply in accordance with Section 15100. Valves shall be suitable for operation on 120-volt, single phase, 60 Hertz current, and designed to open when energized.
- C. Connections - All connections 3 inches or greater shall have flanged ends faced and drilled in accordance with 125-lb. ANSI standards. All connections less than 3 inches shall be threaded in accordance with NPT Standards.
- D. Platform - If the gravity deck height exceeds 5 feet, the BFP manufacturer shall provide a platform. The platform height shall be such that the gravity deck of the BFP is easily visible and accessible. The platform shall be constructed such that its placement will not interfere with routine maintenance of the BFP. Handrails and vertical stairs shall be provided for the platform. Kickplates (toe plates) shall be provided which shall project a minimum of 4 inches above the walking surface. The platform and all supports shall be constructed of FRP, structural aluminum, galvanized steel, or Type 304 stainless steel and shall be designed to carry a live load of 200 lbs. per square foot, not to exceed the working stresses for materials in New York State Building Code. All walking surfaces shall be non-slip. Minimum platform width shall be 30 inches. Platforms and supporting structures shall be designed by a Professional Engineer licensed to practice in New York State.

2.04. MOTORS AND DRIVES

A. General

1. All belt drives shall be alternating current (AC) motor with VFD.
2. Each press drive shall be adequately sized for its intended purpose under maximum conditions. Maximum conditions shall be based on the maximum belt speed and maximum sludge loading of the press and the summation of all forces applied to the press.
3. A 2 or 3 HP motor shall drive the gravity drainage section's adjustable belt speed drive with a shaft-mounted gear reducer. The belt speed shall be capable of varying the output speed from 8 to 75 ft/min.



4. Dual 2 or 3 HP motors shall drive the pressure section of the BFP with a shaft-mounted gear reducer. The belt speed shall be capable of varying the output speed from 3 to 15 ft/min. The dual drives shall be driven by a common VFD and separate motor overload protection.
  5. All gear reducers shall be provided with Class 30 cast iron housings and meet applicable AGMA standards for Class II applications.
- B. AC Motors/Variable Frequency Drives
1. The belt press shall have an AC gear motor with a VFD. The gear motor and VFD controls shall work on 480-volt, 60 Hertz, 3-phase power. The gear motor shall be TEFC. The gear motor shall be NEMA B design with inverter grade insulation.
  2. All AC motors, VFDs, controls, and other electrical equipment shall be in full compliance with Division 16 Electrical Specifications. Submit a written statement from the motor manufacturer endorsing the use of their product with the VFDs specified in Section 16480. Variable frequency drives shall be of the same manufacturer as all other VFDs provided on the project by the General Contract.
- C. All motors shall be in accordance with Section 15170.

## 2.05. CONTROLS

- A. PLCs, PLC programming, and HMIs provided for the specified control panels shall be in accordance with Section 17100.
- B. All controls shall be routed through the BFP PLC.
- C. Each BFP will have its own control panel, and both control panels shall be mounted in one enclosure. There shall be dedicated PLCs and HMIs for each BFP (two total). The BFP control panel shall be PLC-based and contain all controls and electrical equipment necessary to provide a complete, functional sludge dewatering system. The belt press control panel shall contain controls for the Belt Press, Washwater Booster Pump, hydraulic system, Thickened Sludge Pumps, BFP polymer feed pump, and VFDs as described within these specifications and shown on the Contract Drawings. All electrical equipment and wiring shall be in accordance with Division 16 Electrical Specifications. All wiring upon the press shall be run in PVC-coated conduit. All press wiring shall be prewired to a junction box provided with and mounted on the unit with labeled terminal strips.
- D. As a minimum, the PLC shall monitor speed, run/fault, Hand-Off-Auto status setting signals from the BFP, hydraulic pack, wash water booster pumps, thickened sludge pumps, flow meter, and BFP polymer feed system (PS-2). The BFP control system shall allow the operation of the BFP and ancillary equipment without the PLC by putting all of the Hand-Off-Auto settings to Hand.
- E. All signals within the PLC enclosure shall be wired to the PLC as inputs or outputs (I/O).
- F. Belt Press Control Panel
1. The panel shall include a PLC in accordance with Division 17. The control panel shall include transformers, relays, switches, lights, timers, terminal boxes, circuit breakers, wiring, and all other necessary accessories to make a complete system. All wiring shall be in accordance with the National Electrical Code.
  2. Each control panel shall be configured with a 17-inch diagonal, color HMI. The HMI shall be the main operator interface for monitoring the BFP and shall be located on the exterior door of the control panel. The HMI shall graphically emulate the hardware features described

herein. Graphic screens shall be provided for all parameters listed in this specification. References to "run" lights and "alarm" lights, graphical indicators, digital indicators and the like shall be interpreted to mean function shall be graphically displayed on the HMI. The HMI shall also display at minimum flow rates, run hours, user adjusted set points for time delays, and speed displays. Create interactive graphic screens and submit for shop drawing review.

3. Each Belt Filter Press shall have one control panel. The control panels for both belt filter press shall be housed in one NEMA 4X enclosure and shall be in conformance with Section 16161. The panel shall be preassembled and prewired to a numbered terminal strip and suitable for wall mounting in the BFP area of the Operations Building.
4. The manufacturer shall provide a complete electrical wiring diagram and schematic for the belt press control panel to the Owner, Engineer, and Contractor. The wiring schematic shall indicate correlated terminal and field wiring which will be required between the control panel, the belt press, and associated appurtenances.
5. All junction boxes and other electrical components mounted on the BFP shall be of NEMA 4X construction.
6. The control panel shall be designed to accept 480-volt, 60 Hertz, 3-phase power.
7. Lightning and Surge Protection - ANSI/IEEE C62.41 Categories A and B with 0.3 to 0.7 percent.
8. The enclosure shall house a flange-mounted main disconnect, a PLC, interlocks, alarms, indicating lights and operator controls required for the operation of the BFP and auxiliary equipment described in this specification section. Each AC motor, contactor and wiring shall be protected by a properly-sized motor starter protector and overload relays.
9. The VFDs for the BFP, polymer delivery system, and BFP feed pumps will be located in the Electrical Room and have NEMA 12 enclosure. All VFDs provided under this contract shall be the same manufacturer.
10. All parts of the panel shall be amply proportioned for all stresses that may occur during fabrication, erection and operation. All exterior seams shall be continuously welded and ground smooth. Hinged doors shall be provided across front of panel for access to inside of panel. Doors shall be of pan-type construction, gasketed and with locking handle and three-point latch. No protruding door handles shall be used. Door locks shall be keyed alike. Subpanels shall be provided for terminal boards and rear-mounted components.
11. Angle braces shall be provided for support of deep case, flush-mounted instruments. No panel face mounting screws shall be visible from front of panel. The entire control panel shall not exceed the following dimensions: a width of 40 inches, a depth of 12 inches, and a height of 60 inches.
12. All surfaces shall be degreased, bonderized and ground smooth. Exterior surfaces shall be finished smooth.
13. All panel-mounted instruments, switches, indicator lights, etc. shall be factory wired to labeled terminal strips for external connections.
14. All electrical wiring within the panel shall be colored, coded, bundled and bound with plastic slip-lock straps and/or wireway, and terminated on a numbered and labeled terminal strip. Wiring shall be in accordance with National Electrical Code. All interconnecting wiring to

terminal boards shall be made with insulated crimp connectors (ring-tongue-type). Panel wiring shall be No. 14 AWG minimum stranded copper wire with thermoplastic insulation THWN rated for 600 volts and 75 degrees C. Provide all necessary wiring required for complete and integrated system.

15. The main power supply to the control panel shall pass through a manual disconnect switch mounted in the panel. Each individual component powered from the BFP control panel shall have an overload and an overcurrent protection. One duplex utility outlet shall be installed in the panel to facilitate service work. One fluorescent light and fixture shall be installed in the panel.
16. Nameplates shall be provided to identify each component mounted on the panel face.

G. Emergency Shutdown

1. Emergency shutdown shall consist of immediately stopping belt drives, wash water booster pump, hydraulic system, belt press feed pump, and polymer feed pump. The emergency shutdown shall interrupt all power to the equipment and activate the local audible alarm in the BFP control panel.
2. Emergency shutdown shall be initiated by either of the following:
  - a. Pulling the emergency trip cord at the belt press.
  - b. Pushing the emergency shutdown button on the BFP control panel.
  - c. Belt misalignment beyond limits.
3. If trip cords are used for emergency shutdown, the trip cords shall be located on each side of the press. The switch shall be a maintained contact closure with reset. The control wiring shall be such that in the event the emergency trip cord is pulled, power to the BFP and appurtenant equipment can be reset only at the BFP control panel.
4. Controls shall also accept shutdown signal from BFP feed pumps, polymer feed system (PS-2), and dewatered sludge pumps and cause emergency shutdown.

H. The BFP control panel shall contain the following controls, as a minimum:

1. System Start/Stop Pushbutton - When machine start is signaled by pushbutton, an automatic program shall sequentially:
  - a. Start the corresponding BFP equipment drives and auxiliary equipment, wash water booster pump, wash water solenoids, and hydraulic solenoids. Belt press subsystem shall pre-wet the filter belts.
  - b. After an adjustable timed interval, start of the Thickened Sludge Pump and Polymer Feed Pump.
  - c. Pass conditioned sludge through the gravity zone, pressure zone, shear/pressure zone, and discharge the cake.
2. When machine is signaled by the Stop pushbutton, or an adjustable timer, an automatic program shall sequentially:
  - a. Stop BFP feed and polymer feed, and dewatered sludge pump.

- b. Continue for an adjustable timed cycle to completely wash the belts and discharge all cake from the press.
  - c. Complete shutdown of the belt press and all subsystems.
  - d. Leave the system ready for the next operating call.
- 3. The above sequence (a through d) shall hereinafter be referred to as "programmed shutdown." Instant shutdown shall consist of immediately stopping belt drives, Washwater Booster Pump, hydraulic powerpack, Thickened Sludge Pump, and Polymer Feed Pump. During operation, the control subsystem shall monitor the following conditions and perform the appropriate response as noted:
  - a. Minor Misalignment of Screen Belts - Realigned by automatic tracking system.
  - b. Belt Alignment Beyond Limits - Emergency shutdown.
  - c. Low Washwater Pressure - Programmed shutdown.
  - d. Low Hydraulic System Pressure - Programmed shutdown.
  - e. Low Hydraulic Oil Level - Programmed shutdown.
  - f. Tensioning Failure - Programmed shutdown.
  - g. Emergency Trip - Emergency shutdown.
  - h. Thickened Sludge Pump Failure - Programmed shutdown.
  - i. Polymer feed system (PS-2) Failure - Programmed shutdown.
- I. The BFP control panel shall contain the following controls as a minimum for the belt press system to complete the functions as specified:
  - 1. Belt Drive Controls
    - a. BFP Hand-Off-Auto Switch - Each of the BFP drives will have its own Hand-Off-Auto switch. In the Hand position, the BFP drive shall run. In the Auto position, the drives shall run when the system Start pushbutton is pressed.
    - b. VFD units shall be mounted in the electrical room. Belt drive speed control potentiometer(s) shall be located at the belt press control panel and shall be calibrated from 0 to 100 percent of speed. Each of the three drives shall have their own speed potentiometer. Speed display for each potentiometer shall be via the BFP controls HMI.
  - 2. Hydraulic Powerpack Hand-Off-Auto Switch - In the Hand position, the hydraulic powerpack shall run and the tensioning and tracking systems shall be activated. In the Auto position, the hydraulic powerpack shall run when the system Start pushbutton is pressed.
  - 3. Washwater Booster Pump Hand-Off-Auto Switch - In the Hand position, the wash water booster pump shall run and wash water solenoid valves shall be energized. In the Auto position, the wash water booster pump and wash water solenoid valves shall operate when the system Start pushbutton is pressed.

4. Elapsed Timer Meters - Provide contacts for connection to remote monitoring for run indication for the filter belts and VFD drive unit. For each equipment item with run indication monitored, derive runtime hours (to the tenths) and start counts and store within a PLC memory register.
5. BFP Feed Pumps (Thickened Sludge Pumps)
  - a. Hand-Off-Auto Switches - In the Hand position, the feed pump shall operate. In the Auto position, the feed pump shall be controlled by a contact closure in the BFP automatic control system.
  - b. BFP manufacturer shall provide two potentiometer-controlled 4-20 mADC outputs to control the speed of each of two BFP pumps, each driven by a dedicated feed pump VFD located in the electrical room. Speed display shall be via the BFP controls HMI.
  - c. A pump selector to switch between the Thickened Sludge Pumps shall be provided on the control panel.
6. Belt Filter Press Polymer Feed System (PS-2) Hand-Off-Auto switch - In the Hand position, the polymer feed system (PS-2) shall operate. In the Auto position, the polymer feed system (PS-2) shall be controlled by the BFP automatic control system. Potentiometers shall be installed in the BFP control panel by the panel manufacturer. The polymer feed system (PS-2) VFD shall be in the Electrical Room. The speed display shall be via the BFP controls HMI.
7. Provide a fused disconnect switch with external operator to shut down all incoming power to the BFP control panel.
8. Red "run" lights shall be panel mounted to the belt press control panel for the following items:
  - a. BFP belt drive.
  - b. BFP Washwater Booster Pump.
  - c. Polymer Feed Pump.
  - d. Thickened Sludge Pump.
  - e. Hydraulic pack.
9. Amber "alarm" lights shall be provided at the belt press control panel for the following conditions:
  - a. BFP belt tracking failure.
  - b. BFP low wash water pressure.
  - c. BFP tensioning failure.
  - d. Polymer feed system (PS-2) failure.
  - e. BFP feed pump (Thickened Sludge Pump) high pressure.
  - f. BFP feed pump (Thickened Sludge Pump) low pressure.

- g. BFP emergency trip.
  - h. BFP system failure.
  - i. BFP low hydraulic system pressure.
  - j. Hydraulic pack low hydraulic oil level.
  - k. BFP feed pump (Thickened Sludge Pump) failure.
  - l. Any of the above alarm conditions shall cause illumination of the fault light at the press control panel and the sounding of an audible alarm at the belt press control panel. Two sets of contacts shall be provided for a remote alarm, one normally open and one normally closed.
- 10. A test light circuit utilizing relays shall be provided to test all indicator lights on the BFP control panel. Each indicator light shall be provided with contacts for testing. When activated by lamp test pushbutton, the relays shall block out the field contacts of each light and apply test circuit power to the light. Lights shall be wired in parallel in test circuit so that loss of one light shall not affect the test of remaining lights. A single test pushbutton shall be provided to activate all lights. When the test pushbutton is depressed, lamps shall light if they are operative.
  - 11. The Thickened Sludge Pump rate measured by the flow meter for the Thickened Sludge Pumps shall be displayed via the BFP control HMI.
  - 12. An acknowledge/reset pushbutton shall be provided.
  - 13. Upon loss of plant utility power, controls shall be arranged to require a manual restarting of all system drives by the initiation of a system reset.

## 2.06. FABRICATION REQUIREMENTS

- A. Standardization of Grease Fittings - All grease fittings shall be supplied in accordance with Section 01620.
- B. Shop preparation and shop and field coats of paint shall be applied in accordance with Section 09900 and as specified herein.

## PART 3 EXECUTION

### 3.01. EQUIPMENT INSTALLATION

- A. The equipment shall be installed by the Contractor in accordance with the instructions of the manufacturer and Sections 01400 and 01620, including furnishing oil and grease for initial operation. The equipment shall be shop assembled and tested to the fullest extent possible.

### 3.02. FIELD TESTING AND INITIAL OPERATION

Tests, trials, and initial operation shall be performed on the sludge dewatering system in accordance with this specification and Sections 01620 and 01650. Contractor shall furnish all oil and grease for initial operation.

- A. The Contractor shall be required to satisfactorily perform both a preliminary field test and a final acceptance test for the BFP. After the mixers have been installed and initial adjustments have been made, a preliminary field test shall be performed in the presence of the Owner. After the Owner agrees that the preliminary field test has been performed satisfactorily, a final acceptance test shall be performed in the presence of the Owner who will be the approval authority for the acceptance test.
- B. All expenses for conducting the field tests shall be part of the cost for this section.
- C. All defects or failures noted during the tests shall be corrected as approved by the Owner. All costs associated with the required corrective action shall be borne by the Contractor.
- D. Preliminary Field Test - The following preliminary field test shall be conducted prior to the final acceptance test:
  - 1. Verify that the BFP, wash water booster pump, hydraulic pump, and control panels are installed in accordance with the Contract Specifications and Drawings and with the manufacturer's recommendations.
  - 2. Verify that the BFP and wash water booster pump and hydraulic pump have been properly lubricated, aligned, and adjusted in accordance with the manufacturer's instructions and are ready for operation.
- E. Final Acceptance Test - The following final acceptance test shall be conducted:
  - 1. Demonstrate that the hydraulic pump delivers the pressure needed for proper system operation.
  - 2. Demonstrate that the wash water booster pump delivers the flow and pressure needed for proper belt washing.
  - 3. Demonstrate that each belt drive operates properly through the entire specified belt speed range.
  - 4. Demonstrate that each belt tensioning mechanism will provide the specified range of belt tension.
  - 5. Demonstrate that the BFP system will condition and dewater the specified pounds per hour of solids specified of the type specified. The belt press feed pumps, polymer system, and dewatered sludge pumps shall be fully installed and operational before this test is run. Sludge shall be fed to the belt press by the belt press feed pump. Feed sludge for this test shall be from the secondary digester.
  - 6. The dewatering test shall be run for a minimum period of two hours. Sludge feed, filtrate, and cake discharge samples shall be taken and documented at the start of the test and every 30 minutes thereafter (for a total of 5 samples). At no time during the test shall cake solids fall below 24 percent solids, solids capture fall below 95 percent, nor shall the polymer usage exceed the maximum polymer usage as determined by the polymer manufacturer. A final test report shall be submitted to GHD and Erie County Water Authority for approval. A red tag will not be issued unless the final report has been certified and submitted by the manufacturer of the BFP.
  - 7. Demonstrate that all controls at the belt press control panel operate properly.

### 3.03. SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. Provide manufacturer's (or supplier's) services according to Section 01620.
- B. In addition to the services listed in Section 01620, the manufacturer shall supply two separate emergency service calls within 24 hours of notification at no cost to the Owner.
- C. The manufacturer shall provide one personnel to be present on-site for a minimum of 7-days per belt filter press for on-site training. The on-site training must accommodate all work shifts. CONTRACTOR is responsible for coordinating on-site training with ECWA and the manufacturer.
- D. Contractor shall submit proposed training agenda to ECWA and the ENGINEER for review and approval in accordance with Section 01821.
- E. Training sessions shall be videotaped in accordance with Section 01821. A DVD of the recording shall be provided with the O&M Manual.

### 3.04. GUARANTEE

- A. In addition to the general guarantee in the General Conditions, the Contractor shall provide the Owner with a guarantee from the belt press manufacturer. This maintenance guarantee shall be in force for a period of three years from the date of initial startup of the BFP.
- B. This shall guarantee the mechanical performance of the frame, frame coatings, rollers, roller coatings, bearing and bearing coatings. It shall further guarantee repair (parts and labor) and correction or replacement of any defect in these components, which may become evident at any time during the three-year period, at no cost to the Owner. This guarantee specifically excludes normal wear items such as belts and seals.
- C. Limit of liability shall be 100 percent of the total equipment cost.

END OF SECTION



## SECTION 11351

### MECHANICAL MIXING EQUIPMENT

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. Scope:
  - 1. CONTRACTOR shall provide all labor, materials, services, equipment and incidentals as shown, specified and required to furnish and install mechanical mixing equipment complete and operational.
  - 2. Equipment locations are as shown on the Contract Drawings.
- B. Coordination - Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before the mechanical mixing equipment Work.

##### 1.02 RELATED SECTIONS

- A. General Contract Conditions
- B. Section 01331 - SHOP DRAWING PROCEDURES.
- C. Section 01620 - EQUIPMENT-GENERAL.
- D. Section 01650 - STARTUP OF SYSTEMS.
- E. Section 01730 - INSTALLATION DATA.
- F. Section 05500 - MISCELLANEOUS FABRICATIONS.
- G. Section 09900 - PAINTING.
- H. Section 15170 - MOTORS.
- I. All Division 16 Specifications.
- J. All Division 17 Specifications.

##### 1.03 REFERENCE STANDARDS

- A. Standards referenced in this section are listed below:
  - 1. American Bearing Manufacturers Association, (ABMA).
  - 2. American Gear Manufacturers Association, (AGMA).
  - 3. American National Standards Institute (ANSI).
    - a. ANSI/NFS Standard 61, Drinking Water System Components Health Effects.
  - 4. American Society for Testing and Materials, (ASTM).
  - 5. Institute of Electrical and Electronic Engineers, (IEEE).
  - 6. National Electrical Code, (NEC).
  - 7. National Electrical Manufacturers Association, (NEMA).
  - 8. National Fire Protection Association, (NFPA).
    - a. NFPA 79, Electrical Standard for Industrial Machinery.
  - 9. The Society for Protective Coatings, (SSPC).

## 1.04 SUBMITTALS

- A. Shop Drawings: Submit the following:
1. Manufacturer's literature, data sheets, fabrication, assembly and mounting drawings of the following components showing materials and significant dimensions in sufficient detail to demonstrate compliance with specified requirements.
    - a. Impellers:
      - 1) Diameter.
      - 2) Tip speed at maximum shaft speed and at the minimum required water horsepower.
      - 3) Materials of construction.
      - 4) Stress at maximum load.
      - 5) Setting elevation.
      - 6) Water horsepower at maximum speed and minimum temperature.
      - 7) Power number.
    - b. Impeller Shafts:
      - 1) Diameter.
      - 2) Materials of construction.
      - 3) Critical speed of rotating assembly.
      - 4) Torsional, bending and combined stresses at maximum load.
      - 5) Coupling details.
      - 6) Impeller connection details.
      - 7) RPM:
        - a) At maximum motor speed.
        - b) At minimum required water horsepower.
        - c) At maximum water horsepower at reduced speed.
    - c. Gear Reducers:
      - 1) Model Number.
      - 2) AGMA horsepower rating.
      - 3) Materials of construction.
      - 4) Efficiency.
      - 5) Bearing Ratings.
      - 6) Lubrication details, including all NSF approval for all lubricants.
      - 7) Bearing life under maximum loading conditions.
    - d. Motors:
      - 1) Horsepower.
      - 2) RPM.
      - 3) Insulation and enclosure details.
      - 4) Efficiency at 1/2, 3/4 and full load.
    - e. Electrical Information - Wiring diagrams showing all electrical connections to the motor.
    - f. For all components of mechanical mixing equipment as appropriate, including setting drawings and instructions for installation of anchor bolts and gear reducer, including tolerances.
    - g. Test reports.
- B. Support Design Information: Submit for record purposes only:
1. Weight of the complete assembly, including lubricant.
  2. Impeller shaft and impeller weight.
  3. Torque load.
- C. Calculations Supporting Design: Submit for record purposes only:
1. Shaft and impeller stresses.
  2. Power number.
  3. Critical speed.
  4. Bearing life.
  5. Tip speed.
  6. Water horsepower.

## 1.05 QUALITY ASSURANCE

- A. Mechanical Mixing Equipment Manufacturer's Qualifications:
  - 1. For the purpose of this section, "mechanical mixing equipment manufacturer" shall mean the manufacturer of the impeller, impeller shaft, and gear reducer.
  - 2. Manufacturer shall have a minimum of 10 years' experience producing substantially similar equipment and shall be able to show evidence of at least 5 installations in satisfactory operation for at least 5 years.
  - 3. Manufacturer shall be a member of AGMA.
  - 4. Manufacturer's facilities shall include a mixing technology laboratory capable of performing scaled process evaluations.
- B. Component Supply and Compatibility:
  - 1. Obtain all equipment included in this section regardless of the manufacturer, including gear reducer support mounting hardware, shim material and lubricants, from a single mechanical mixing equipment manufacturer.
  - 2. The mechanical mixing equipment manufacturer to review and approve or prepare all shop drawings and other submittals for all components furnished under this section.
  - 3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall equipment by the mechanical mixing equipment manufacturer.
  - 4. The gear reducer, shaft and impeller shall be designed, manufactured and tested by the equipment manufacturer.
- C. Operation and Maintenance Manuals:
  - 1. Submit complete Installation, Operation and Maintenance Manuals, including, test reports, maintenance data and schedules, description of operation, and spare parts information.
  - 2. Furnish Operation and Maintenance Manuals in conformance with the requirements of Section 01781.

## 1.06 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling and Unloading - Deliver materials to the site to ensure uninterrupted progress of the Work.
- B. Storage and Protection - Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
- C. Acceptance at Site - All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace loss and repair damage to new condition in accordance with manufacturer's instructions.
- D. Packing:
  - 1. Inspect prior to packing to assure that assemblies and components are complete and undamaged.
  - 2. Protect machined surfaces and mating connections.
  - 3. Protect bearings and gearing with a shop applied corrosion prevention coating.
  - 4. Cover all openings into gear boxes with vapor inhibiting and water repellent material.
  - 5. Crate in a manner, which will prevent damage during shipment, delivery and storage.
  - 6. Identify crate contents by a packing slip fastened to the outside of the crate.

## 1.07 TOOLS, SPARE PARTS, AND MAINTENANCE MATERIALS

- A. Furnish and deliver the following boxed and labeled:
  - 1. One set of bearings, shims and seals for each size of gear reducer.
  - 2. Furnish two quarts of finish paint used on the gear reducers and impellers.
  - 3. Two complete sets of any special tools required for normal maintenance and operation.
- B. Furnish a supply sufficient to change the oil and grease in all the gear reducers. Products shall be as recommended by the equipment manufacturer.
- C. Spare parts shall be packed in sturdy containers with clear indelible identification markings and shall be stored in a dry, warm location until transferred to the OWNER at the conclusion of the project.

## 1.08 WARRANTY

- A. Provide equipment warranty in accordance with the General Conditions, Supplementary Conditions, and Section 01620.

## PART 2 PRODUCTS

### 2.01 SYSTEM PERFORMANCE

- A. General - Equipment shall be designed to be suitable for the process and service conditions as described below and shown in the design criteria.

Design Conditions	Design Criteria
Number required	1
Reactor tube size - L x W <sup>(1)</sup>	2' 5-7/16" x 7' 6"
Side water depth <sup>(1)</sup>	2
Pumping direction, (up/down)	Down
Basin bottom elevation	580.25
Drive motor horsepower	3/4 HP
Maximum output speed (RPM)	1800
Minimum impeller diameter	10"
Maximum impeller diameter	11- 1/2"
Minimum impeller shaft diameter	1"
Drive motor voltage/phase/Hertz	460/3/60

### 2.02 MANUFACTURERS

- A. Products and Manufacturers: Provide one of the following:
  - 1. Philadelphia Mixer.
  - 2. Lightnin.
  - 3. Chemineer.

### 2.03 DETAILS OF CONSTRUCTION

- A. General
  - 1. The mechanical mixer assembly shall consist of an impeller, impeller shaft, gear reducer and drive motor.
  - 2. Sound level shall not exceed 85 dBA at a distance of three feet from the drive assembly at any operating speed.
  - 3. Design equipment for 24 hours per day continuous operation.

4. Design mechanical mixer assemblies to run at any operating speed at any liquid level in the basin, including empty, without mechanical damage.
- B. Impellers
1. General - Provide a single, low speed, field removable, three or four blade hydrofoil or pitched blade turbine-type impeller specially designed to minimize shear and turbulence while maximizing fluid motion. Power number shall not exceed 1.65. Provide down pumping impellers as required in the design criteria table. Key the impeller to the shaft.
  2. Diameter - Refer to the design criteria table.
  3. Water Horsepower - Refer to the design criteria table.
  4. Tip Speed - Provide as required for optimum performance, but not to exceed 16 feet per second at the required water horsepower.
  5. Combined Tensile and Shear Stress - Not to exceed 11,000 psi under maximum loading conditions.
  6. Materials:
    - a. Use Type 316 stainless steel hardware to assemble the impeller or fasten the impeller to the shaft.
    - b. Remove mill scale, rust and contaminants.
    - c. Grind smooth welds, sharp corners and sheared edges.
    - d. Construct impeller of Type 316 stainless steel.
- C. Impeller Shafts:
1. General:
    - a. Provide overhung solid shaft design.
    - b. Bearings located outside of the gear reducer are not permitted.
    - c. Connect impeller shaft to the output shaft of the gear reducer by means of a coupling located above the mounting platform. Provide for removal (dropping) of the shaft without disturbing the gear reducer housing or any internal components.
  2. Materials: Type 316 stainless steel.
  3. Combined tensile and shear stress: Not to exceed 8,000 psi at maximum load.
  4. Runout: Not to exceed 1/8-inch for every 10 feet of overhang as measured when turning by hand.
  5. Couplings: Use rigid flanged bolted type couplings connected to the shafts by welding or an interference fit. Mating faces shall utilize a rabbetted male and female connection and shall not require match marks for alignment. Use same materials as specified for the shafts.
  6. Critical Speed: Maximum output shaft speed shall not exceed 50 percent of the first lateral critical speed.
  7. Keyway: Provide for field adjustment of the impeller setting of not less than 9 inches above and below the setting in 3-inch or less increments.
- D. Gear Reducers:
1. General:
    - a. Construction: Provide right angle gear reducer in accordance with AGMA Standards.
    - b. Nameplate: Provide stainless steel nameplate with AGMA calculated drive horsepower rating.
    - c. Maintenance: Recommended lubricant change interval shall not be less than 2,500 hours or 6 months, whichever comes first.
    - d. Efficiency: Gear drive train efficiency shall not be less than 90 percent.
    - e. Cooling: External cooling coils or devices to dissipate heat will not be acceptable.
    - f. Openings: Provide water and dustproof covers.
    - g. Internal Output Shaft Diameter: Equal to or greater than the impeller shaft diameter.
  2. Rating:
    - a. Gear reducers, which include separate shaft bearings, located above and below the main drive bearings and a torsionally resilient coupling at the impeller shaft, shall have a minimum rating of 1.5 times the rated horsepower of the drive motor.

- b. Gear reducers, which incorporate bearing arrangements other than that, described above, shall have a minimum rating of 2.0 times the rated horsepower of the drive motor.
  - 3. Lubrication:
    - a. All lubricants shall be NSF approved.
    - b. Provide easy filling and draining without spills.
    - c. Provide dry well construction designed to eliminate oil leakage at the output shaft.
    - d. Provide splash or immersion oil lubrication from a common sump for all gearing.
    - e. Provide a dipstick and/or sight glass to observe oil level.
    - f. Output shaft bearings may be grease lubricated. All other bearings shall be submerged in the lubricating oil. Inlet and outlet grease fittings shall be accessible from outside the gear reducer housing. Provide neoprene covers over fittings.
  - 4. Bearings:
    - a. Type: Tapered roller.
    - b. Rating: AFBMA L-10 rating at the supplied motor nameplate horsepower shall not be less than 200,000 hours.
  - 5. Gears and Gearing:
    - a. General: Gear reducer assembly shall incorporate a double or triple reduction gear drive system.
    - b. Type: Gearing shall be a combination of helical and spiral bevel. Worm gearing is not acceptable.
    - c. Gear Quality: AGMA Quality No. 10 or better in accordance with AGMA 390.03.
    - d. Arrangement: Output shaft shall pass through a hollow shaft driven by the gear train.
    - e. Individual Gear Ratios: Not to exceed 7 to 1.
- E. Gear Reducer Housing:
  - 1. Materials: Close grained cast-iron, ductile iron or stress relieved fabricated steel.
  - 2. Accessories: If lifting lugs are not integrated into the reducer, provide separately.
  - 3. Openings: Provide water and dustproof covers and seals over all openings.
- F. Gear Reducer Mounting:
  - 1. General: Provide a gear reducer support pedestal or steel support frame designed to:
    - a. Support the gear reducer.
    - b. Provide easy access to the impeller shaft coupling and reducer oil drain. Oil drain clearance shall not be less than 12 inches and shall be adequate to fit a bucket, which will accept 120 percent of the oil contained in the gear housing.
    - c. Mount on the support platform as shown.
  - 2. Materials:
    - a. Use same materials as specified for the gear reducer housing.
    - b. Steel support frames shall be fabricated from structural steel channels, angles and plates having a minimum thickness of 5/16-inch.
  - 3. Mounting Hardware and Shim Material: Use Type 316 stainless steel hardware and shim material for mounting the gear reducer to the pedestal or frame.
- G. Anchor Bolts:
  - 1. General: Provide as required to mount the gear reducer support pedestal or frame to the support platform.
  - 2. Materials: Type 316 stainless steel.
  - 3. Size and Number: As recommended by manufacturer for mounting in accordance with the details shown and sufficient to withstand the torque and other loadings transmitted by the gear reducer. Anchor bolts shall conform to the requirements of Division 5.
- H. Drive Motors:
  - 1. Motors shall conform to the requirements of Section 15170 and applicable Sections in Division 16 specifications.
  - 2. Suitability: Suitable for the torque load, variations in torque and other loading conditions imposed by the gear reducer and be "inverter duty rated."

3. Ratings:
    - a. Nameplate horsepower rating and allowable temperature rise shall not be exceeded under any specified loading condition at any operating speed.
    - b. Motors shall not be rated at less than 3/4 HP nor less than the rating shown in the design criteria table.
  4. Speed:
    - a. Maximum: 1800 rpm.
  5. Enclosure: TEFC with a finned cast housing.
  6. Service Factor: 1.15 minimum. (1.0 for inverter duty)
  7. Applicable Standards: IEEE, NEMA, ABMA, ANSI.
  8. Gear Reducer Connection: Provide an easily accessible torsionally resilient flexible coupling between the motor and the gear reducer. Provide a coupling guard.
  9. Motor Bearings: Extended duty type, L-10 rating greater than 100,000 hours at maximum load.
  10. Insulation: Class H or better.
  11. Temperature Rise: Limit to Class B temperature rise at 50°C ambient at full load.
  12. Type: Horizontal with standard C-faced NEMA frame or NEMA T-frame and shaft.
  13. Nameplate: Provide a stainless steel nameplate describing motor characteristics and required lubricants.
  14. Electrical Requirements: AC motors shall be designed for 460 volt, 3 phase, 60 Hertz current at the voltage indicated.
  15. Motor Efficiency: AC motors, one horsepower and larger shall be energy efficient motors as described in NEMA MG-1, and in Section 15170.
  16. Integral motor winding thermostats shall be embedded and sealed in the end of each stator phase in conjunction with and supplemental to the external overload detection. The mixer's control shall shut down the mixer should any of these thermostat sensors detect high temperatures and automatically reset once the temperature returns to normal. However, the mixer controls shall be manually reset to restart the motor. A contact shall be provided for remote annunciation of the motor winding shutdown.
- I. Drives: The manufacturer of the mechanical mixers and motors shall provide a certification letter from the manufacturer of the drives indicating that the motors will operate within the ranges specified and are compatible with the variable frequency drives specified in Section 16480.
  - J. Controls shall be as shown on the Electrical Drawings, as specified with Division 16, Electrical Specifications and Division 17, Instrumentation and in full compliance with this section.

## PART 3 EXECUTION

### 3.01 INSPECTION

- A. Inspection:
  1. Inspect and verify that structures or surfaces on which the equipment will be installed have no defects, which will adversely affect installation.
  2. Inspect all equipment prior to installation.
  3. Promptly report defects, which may affect the Work to the ENGINEER.

### 3.02 INSTALLATION

- A. Installation shall be in accordance with manufacturer's instructions and recommendations, approved shop drawings, and Section 01620.
- B. Gear Reducer Support: Refer to details as shown. Accurately shim and align the base. Use non-shrink epoxy grout and anchor bolts to set bases on concrete platforms.

- C. Lubricants: Install products recommended by equipment manufacturer and NSF approved for initial operation.
- D. Furnish oil and grease for initial operation and one complete oil change. Grades of oil and grease shall be in accordance with the recommendations of the equipment manufacturer.

### 3.03 PAINTING

- A. Surface preparation and painting shall conform to the requirements of Section 09900.
- B. Extent: Shop primer and shop finish coat the exposed ferrous surfaces of the motor, gear reducer, support structures, gear reducer shaft, coupling, impeller shaft and impeller, except for stainless steel surfaces.
- C. Painting Systems:
  - 1. Surfaces above the Mounting Platform:
    - a. System: Provide in accordance with the requirements of Section 09900, Painting, for exterior non-submerged ferrous metals.
    - b. Finish Color: Blue or Manufacturer's Standard with OWNER's approval.
    - c. Finish Texture: Glossy.
  - 2. All Other Surfaces:
    - a. System: Provide in accordance with the requirements of Section 09900 for submerged ferrous metals, except that the paint system shall be listed in ANSI/NSF Standard 61 and approved by the applicable regulatory agency for contact with potable water.
    - b. Finish Color: Manufacturer's standard with OWNER's approval.
    - c. Finish Texture: Smooth, glossy.

### 3.04 STARTUP AND TESTING

- A. Perform tests and initial operation as set forth in Section 01620.
- B. Running Test: Operate gear reducer of each size at maximum speed using a rust inhibiting break-in oil prior to shipment to check for proper operation, excessive noise and vibration.
- C. Perform operating tests to demonstrate that the equipment operates over its speed range without excessive vibration and without exceeding the specified noise limits.
- D. Make adjustments required to place equipment in proper operating condition.
- E. Following the initial two weeks of operation, lubrication oil shall be thoroughly drained and flushed with food grade mineral flushing oil in accordance with manufacturer's recommendations. Install products recommended by equipment manufacturer for operation. Oil shall be tested after initial six months of operation and results shall be submitted to ENGINEER. Oil shall be tested in accordance with manufacturer's recommendations. At a minimum, testing shall include temperature, color, viscosity, flash point, fire point, and pour point. Oil shall be replaced at the CONTRACTOR's expense should the test have negative results.



3.05 MANUFACTURER'S SERVICES

- A. The CONTRACTOR shall arrange for the equipment manufacturer to furnish the services of a qualified representative in accordance with Section 01620.
- B. A written report covering the representative's findings and installation approval shall be mailed directly to the ENGINEER covering all inspections and outlining in detail any deficiencies noted.

END OF SECTION

## SECTION 14600

### DUMPSTER CONVEYING SYSTEM

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. Scope
  - 1. CONTRACTOR shall provide all labor, materials, services, and equipment as shown, specified and required to furnish and install two Dumpster Conveying System in Building E.
  - 2. Equipment locations are shown on the Contract Drawings.
  - 3. Disposal containers shall be provided by OWNER via Modern Disposal Services.

##### 1.02 RELATED SECTIONS

- A. General Contract Conditions.
- B. Section 01331 - SHOP DRAWING PROCEDURES.
- C. Section 01620 - EQUIPMENT-GENERAL.
- D. Section 01660 - STARTUP OF SYSTEMS.
- E. Section 01730 - INSTALLATION DATA.
- F. Section 01751 - STARTING AND PLACING EQUIPMENT IN OPERATION.
- G. Section 01781 - OPERATION AND MAINTENANCE DATA.
- H. Section 11350 - BELT FILTER PRESS.
- I. Section 15170 - MOTORS.

##### 1.03 SUBMITTALS

- A. Shop Drawings – Submit in accordance with Section 01300.
- B. Provide assembly, installation manual, and wiring diagrams.

##### 1.04 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling and Unloading:
  - 1. Deliver materials to the Site to ensure uninterrupted progress of the Work.
  - 2. Handle all equipment properly, in accordance with manufacturer's recommendations. Equipment, which is distorted or otherwise damaged, will not be acceptable. Protect all bolt threads and ends from damage.
- B. Storage and Protection:
  - 1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
  - 2. Store all mechanical equipment in covered storage off the ground and prevent condensation.

- C. Acceptance at Site:
  - 1. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace loss and repair damage to new condition in accordance with manufacturer's instructions.

## 1.05 WARRANTY

- A. Provide equipment warranty in accordance with the General Conditions, Supplementary Conditions, and Section 01620.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Dumpster Conveyor System shall be manufactured by the following:
  - 1. D. R. Cordel & Associates, Inc- Dumpster-Veyor™
  - 2. Or approved equal.

### 2.02 RUNWAY AND DRIVE TRACKS

- A. The runway track shall be manufactured using 304 stainless steel and be a built up fabricated section, providing a track system on which the drive and idler carts operate. Tracks shall be positioned under a discharge point so that the track extends in either direction from the discharge point as shown on the Contract Drawings. Track length shall be as indicated on the drawings spaced at approximately 7'-6".
- B. Track joints are spliced using a lap joint. Ends of adjoining tracks manufactured to allow the square bar to overlap the base plate. Track ends are shop fabricated to permit smooth transition from track section to track section during carrier travel. No field welding at track joints is required. The base plate is drilled at regular intervals for mounting to a flat concrete surface using expandable anchors or an epoxy anchor system.
- C. The drive track shall be manufactured using a UHMW guide channel bolted directly to the concrete floor. The guide channel is drilled at regular intervals for mounting to a flat concrete surface using an expandable anchoring system or the epoxy system. Two tracks running from the drive winch to the idler sheave are required spaced at approximately 9" apart. The drive chain rides in the guide channel.

### 2.03 IDLER CARRIERS

- A. One (1) low profile, heavy-duty 304 stainless steel idler carrier having a capacity of 10 tons, and a nominal plan size of 8'-3" by 2'-8" shall be provided for the container handling system. The idler carrier shall be assembled to prevent skewing and racking and to accurately accept the articulating wheel assemblies.
- B. The carriers shall be drilled to ensure articulating axle alignment. The axles shall be held in place by retainer plates, which are easily removable to allow component inspection. Dual wheel stops shall be provided to prevent wheel overload and container roll off when traveling. Stops shall be factory welded and located to clear any obstruction on the underside of the container.
- C. The idler carrier shall be equipped with eight (8) double flanged, 304 stainless steel wheels assembled into articulating trolley assemblies. Articulating trolley assemblies are designed to maintain equal wheel loading at all times during carrier travel. Wheels shall interface with the runway track to allow easy tracking and eliminate binding during travel.

## 2.04 DRIVE CARRIER

- A. One (1) low profile, heavy duty 304 stainless steel drive carrier having a capacity of 10 tons and a nominal plan size of 8'-3" by 2'-8" shall be provided for the container handling system. The unit shall be assembled to prevent skewing and racking and to accurately accept the articulating wheel assemblies.
- B. The carriers shall be drilled to ensure articulating axle alignment. The axles shall be held in place by retainer plates, which are easily removable to allow component inspection. Dual wheel stops shall be provided to prevent wheel overload and container roll off when traveling. Stops shall be factory welded and located to clear any obstructions on the underside of the container.
- C. Center portion of the drive carrier shall be equipped with steel welded lugs for connection of drive chain and swiveling clevis connectors.
- D. The drive carrier shall be equipped with eight (8) double flanged, 304 stainless steel wheels assembled into articulating trolley assemblies. Articulating trolley assemblies are designed to maintain equal wheel loading at all times during carrier travel. Wheels shall interface with the runway track to allow easy tracking and eliminate binding during travel.

## 2.05 ARTICULATING TROLLEY ASSEMBLIES

- A. Each articulating trolley assembly shall consist of 304 stainless steel top pivoting shaft, two (2) 304 stainless steel heavy-duty side plates, two (2) 304 stainless steel double flanged wheels with stainless steel sealed bearings and two (2) 304 stainless steel wheel axles. The top pivoting shaft shall secure the assembly in place on the carrier frame and allow articulating motion for equal wheel loading.
- B. Wheels shall be double flanged, 5" tread diameter for operation of 1-1/2" bar track, with sealed roller bearings. Wheels to be manufactured from 304 stainless steel. Wheels are to be mounted on the free floating axles and mounted in the heavy-duty side plates. All components are easily removable for inspection and replacement if required.

## 2.06 CLOSED LOOP WINCH

- A. A single speed, base mounted, positive control, dual directional electric motor driven carrier puller shall be furnished with the drive carrier. The puller shall operate at a speed to move the container at approximately 18 FPM unless otherwise indicated.
- B. The puller base frame shall be a fabricated steel weldment designed for easy access to motor, gearbox and drive wheel.
- C. The electric motor shall be single speed, 30 min duty rated with high starting torque characteristics. Motor shall be C-Face mounted design with minimum class B insulation. Enclosure shall be NEMA 7.
- D. The gearbox shall be cycloidal type design providing high reduction with minimal space requirements. Cycloidal drive shall be Sumitomo, with grease lubrication. Bearings shall be rated for 5000 hours, L-10 bearing life.
- E. A Zinc plated steel chain seated in a type 304 stainless steel pocket wheel mounted to the output shaft on the cycloidal gearbox shall connect to the idler sheave, also having a 304 stainless steel pocket wheel. The drive sheave and idler sheave shall be mounted in the horizontal plane for a low profile configuration. Drive chain shall run in UHMW guide channel described previously in this specification.

- F. The electric motor shall be TENV 30 min. duty rating, 2 HP, single speed with high starting torque characteristics. Motor shall be C-face mounted design with minimum class B insulation. Motor shall operate on 460 volts, 3 phase, 60 hertz, and control voltage to be reduced to 120-volt single phase.
- G. Two magnetically operated travel limit switches shall be provided to stop carrier movement at extreme ends of the track. Steel lugs are welded to the drive and idler carriers. The steel lugs trip magnetically activated proximity switches, one mounted at each end of the track length.

## 2.07 RETURN IDLER SHEAVE

- A. The return idler sheave shall be mounted horizontally inside a heavy-duty 304 stainless steel weldment designed for low profile and able to withstand truck traffic. Idler sheave is a stainless steel pocket wheel operating on roller bearings. The heavy-duty steel housing includes holes for mounting the unit to concrete floors.

## 2.08 INSTRUMENTATION AND CONTROL SYSTEM

- A. The container handling system manufacturer shall design, furnish and shop wall mounted control station for control of system movement. Controls shall include a 3-phase power circuit controlled by a single-phase control circuit with step down transformer. The control system shall be designed to handle the expected duty cycle of the container handling system. Power supply is 460 volts 3 phase 60 hertz and the control circuit will be 120 volts 1 phase 60 hertz.
- B. Control schematic shall include a variable frequency drive (VFD) used for smooth acceleration and deceleration. The inverter detects over-torque situations and opens the directional circuit and provides dynamic braking to stop carrier movement. Other control features include a warning horn, warning light, power on indicating light and on off switch.
- C. All controls are to be located in a NEMA 7 enclosure for Class 1, Division 2 hazardous environment. Heaters shall be included in control enclosures. Push buttons for control of the system movement shall be mounted in the enclosure door, with indicating lights for "power on," "power off." Enclosure shall be wall mounted and located as directed by the engineer.
- D. A warning horn and light shall be included with the control system. The warning horn shall sound for 15 seconds prior to the system moving and shall be activated by the forward and reverse buttons. The warning light shall flash during horn signal and stay flashing during system movement. Light and horn shall be mounted and located as directed by the ENGINEER.

## PART 3 EXECUTION

### 3.01. PAINTING

- A. Stainless steel surfaces shall not be painted. The motor shall be provided with the manufacturer's standard finish. Surfaces shall be hand cleaned with a wire brush and wiped with solvent prior to painting equipment.
- B. Equipment shall be touch painted in the field after installation. All marks and abrasions shall be primed if required, and finish coated.

### 3.02. INSTALLATION OF EQUIPMENT

- A. Installation shall be in accordance with the manufacturer's recommendations and performed with qualified persons. Tracks shall be anchored to the building floor with stainless steel threaded rod and Epon Epoxy System, or expansion anchors depending on surface conditions.

- B. The Epcon mounting system incorporates a leveling nut under track to set elevation of track along the length. After installation, grout shall be installed under track along the entire length. Drive winch and idler sheave shall be installed the same way if the Epcon system is used.
- C. The concrete floor shall have a constant slope in one direction, not exceeding 1/4" per 10'-0" of run for run-off purposes. Trench drains running perpendicular to the tracks at intervals dictated by the engineer is the preferred method for drainage in a new facility.
- D. Track, guide channel, drive and idler shall be installed at the same elevation (+-) 1/4". Care should be taken to ensure alignment of guide track to drive chain during installation.

### 3.03. EQUIPMENT STARTUP, TESTING AND INITIAL OPERATION

- A. The container handling system shall be tested for proper operation prior to being put into service. All controls, lights, horns, limit switches and stops shall be tested in a no-load situation.
- B. A container to be provided by Modern Disposal Services can be used to perform a partial load test. The container, delivery of the container and removal of the container is to be provided by the owner. An operational and partial load test will be performed with an empty container. The owner is responsible for obtaining a loaded container to perform a full load test.
- C. Tests shall include operating the equipment the full length of the tracks, checking travel limit switches and carrier operation

END OF SECTION

## SECTION 14601

### DAVIT CRANE

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Furnishing and installing of one manually operate davit crane to be used at the decant structure.

##### 1.02 RELATED SECTIONS

- A. Section 01620 - EQUIPMENT-GENERAL.
- B. Section 09900 - PAINTING.
- C. Section 15170 - MOTORS.

##### 1.03 SUBMITTALS

- A. Submit performance affidavits, operating instructions, equipment tests and initial operation requirements as specified in Section 01620.
- B. Submit single-page catalog cuts clearly indicating items to be furnished, including maintenance requirements.
- C. Operation and Maintenance Data: Submit manuals in accordance with these Specifications.

#### PART 2 PRODUCTS

##### 2.01 MANUFACTURERS

- A. Davit crane equipment shall be manufactured by Thern, Inc., or approved equal.

##### 2.02 EQUIPMENT DESIGN AND FABRICATION

- A. Capacity
  1. The capacity of the davit crane shall be 2,000 lbs and shall be permanently marked in a conspicuous manner on the crane.
  2. The crane shall lift its rated capacities with a smooth and continuous operation without speed changes or vibration throughout the entire lifting height.
- B. Materials – All components shall be selected and assembled for a corrosive, exterior environment.
- C. Davit Cranes shall be:
  1. Self-supporting unit of tubular construction with a side mounted pedestal base. Unit shall be all stainless steel construction using stainless steel fasteners and accessories.
  2. Crane shall provide 90-degree rotation with a sleeve bearing in the base.
  3. The crane arm shall be able to reach each chamber located in the decant structure while winching replacement equipment during maintenance activities.
  4. The crane boom shall be adjustable with a telescoping boom and a height adjustment.
  5. Provide manual stainless steel winch attached to the crane for load raising and lowering.
  6. The cable shall be flexible, high-strength, 304 stainless steel wire rope, and have a load safety factor of at least 5 to 1. Cable shall be of adequate length to reach lower level floor.

7. The load block shall be of rugged construction containing a stainless steel swivel hook with anti-friction bearings.
8. The davit crane shall have a winching weight capacity of up to 2,000 lbs.

## PART 3 EXECUTION

### 3.01 PAINTING

- A. All steel components and accessories shall be abrasive blasted and epoxy painted for an exterior/corrosive environment.
- B. All galvanized and aluminum components in contact with concrete shall be backpainted with bituminous paint.

### 3.02 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. The equipment shall be installed by the Contractor in accordance with the instructions of the manufacturer.
  1. In addition to the general requirements of Section 01620 and the foregoing paragraphs; crane equipment shall be shipped, assembled and constructed as follows:
    - a. All bolts shall be 316 stainless steel, furnished 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 but still be convenient for handling.

### 3.03 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 100 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.



### 3.04 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, the equipment manufacturer shall be on site to provide assistance to the CONTRACTOR.
  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.

END OF SECTION

## SECTION 14602

### HOISTS AND MONORAIL

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Furnishing and installing of new hoists, monorail and related equipment for installation on the existing traveling bridge crane in the Belt Filter Press area.
- B. Regulatory codes and requirements.

##### 1.02 RELATED SECTIONS

- A. Section 01620 - EQUIPMENT-GENERAL.
- B. Section 05500 - MISCELLANEOUS FABRICATIONS.
- C. Section 09900 - PAINTING.
- D. Section 15170 - MOTORS.
- E. Section 16480 - VARIABLE FREQUENCY DRIVES.

##### 1.03 SUBMITTALS

- A. Submit single-page catalog cuts clearly indicating items to be furnished, including maintenance and electrical requirements.
  - 1. Include catalog cuts for all hoists, trolleys, pendants 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.

##### 1.04 REFERENCES

- A. Specifications for underhung cranes and monorail systems, published by the Monorail Manufacturers Association, Pittsburgh, Pennsylvania.
- B. ANSI B30.11, Monorail Systems and Underhung Cranes, and ANSI B30.16, Safety Standard for Overhead Hoists.
- C. ASTM-A759 Crane Rails, Carbon Steel
- D. American Institute of Steel Construction (AISC).
- E. American Welding Society (AWS).

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Monorail hoists shall be as manufactured by Han-Tek, Inc., Simmers Crane Design & Services Co., or equal.

### 2.02 EQUIPMENT DESIGN AND FABRICATION

- A. Capacity
  - 1. The capacity of each hoist and monorail system shall be permanently marked in a conspicuous manner on the hoist, crane, and monorail track.
  - 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 and trolley shall have an H-4 heavy-duty service rating, the crane shall be CMMA Class C.
- C. Operating Conditions – The 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. Hoists
    - 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. Hooks shall be of high-grade forged steel construction and shall have swivel anti-friction bearings and safety clips.
    - 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 3 feet above the operating 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. The load chain shall reach the operating floor and the hoist shall be equipped with a chain collector basket.
    - h. 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.
    - i. Hoist gear reducer shall be equipped with a multistage gear transmission through a drum gear.
    - j. Hoist shall include a limit switch device to allow the setting of the hoist to travel within a prescribed travel range.
    - k. Hoist shall include a mechanical overload device designed to protect against damage from attempts to lift an over capacity load.
    - l. Manufacturer shall be R&M Equipment or equal.
  - 2. Hoist Trolleys
    - a. Trolleys shall be integral to the hoist mechanism for manual hoists and provide for lug mounting for electric hoists.
    - b. Trolleys shall have four or more wheels and have sides extending beyond the wheel flanges to provide bumper protection.
    - c. Wheels shall have machined treads, surface hardened to Brinell hardness of 400, and set at the proper angle to bear the load evenly.
    - d. Wheels shall be provided with lifetime lubricated ball or roller bearings.

- e. Trolleys shall be compatible with the track provided by the CONTRACTOR.
- f. Trolley shall be chain driven through a series of gears, with the chain hanging within 3 feet of the operating floor or platform. Each trolley shall have a round eyebolt for suspending the manual hoist.
- g. Trolleys shall be abrasive blasted and epoxy painted for corrosion protection.
- h. Trolleys shall be compatible with the track and associated equipment provided by the CONTRACTOR.
- 3. 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.
- 4. 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.
- 5. 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.
- 6. Controls
  - a. All motions controlled by radio remote control, capable of controlling each crane separate or in tandem as recommended by hoist manufacturer.
  - b. Controls shall be equipped with adjustable geared upper and lower hoist travel limit switches and mechanical overload device.
  - c. The hoist and trolley control shall be suitable for use with a variable frequency drive (VFD) in accordance with Section 16480.

### PART 3 EXECUTION

#### 3.01 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.

#### 3.02 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.

### 3.03 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.

### 3.04 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, the equipment manufacturer shall be on site to provide assistance to the CONTRACTOR.
  - 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.

### 3.05 EQUIPMENT SCHEDULE

- A. All equipment furnished under this section shall be in accordance with the equipment schedule below:

### 3.05 SCHEDULE OF HOISTING EQUIPMENT

#### A. Electronically Operated

LOCATION	CAPACITY (TONS)	TRACK ELEVATION ABOVE FLOOR (FEET)	HOOK HEIGHT ABOVE FLOOR (FEET)	LIFT (FEET)	REMARKS
Building E – Belt Filter Press Area	3	30*	47	45	<p>Replace existing monorail. Existing traveling bridge tracks shall be reused and the monorail shall include an additional cantilevered 9 feet of track.</p> <p>Crane shall be able to lower/raise equipment to/from the operating and basement floor.</p> <p>*Distance measured from operating floor to track elevation.</p>

END OF SECTION

SECTION 15060  
INSIDE PROCESS PIPING

PART 1     GENERAL

1.01     SECTION INCLUDES

- A.     Inside process pressure piping, fittings, and specials located inside structures or on equipment.
- B.     Miscellaneous appurtenances.
- C.     Shop tests.
- D.     Installation.
- E.     Testing.
- F.     Pipe schedule.

1.02     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 01620 - EQUIPMENT-GENERAL.
- F.     Section 01730 - INSTALLATION DATA.
- G.     Section 01731 - CONNECTIONS TO EXISTING FACILITIES.
- H.     Section 01780 - RECORD DOCUMENTS.
- I.     Section 02205 - PROTECTION OF EXISTING FACILITIES.
- J.     Section 02900 - RESTORATION.
- K.     Section 09900 - PAINTING.
- L.     Section 15100 - VALVES AND APPURTENANCES.
- M.     Section 15150 - SUPPORTS AND ANCHORS.
- N.     Section 15260 - PIPING INSULATION.

### 1.03 REFERENCES

- A. American National Standards Institute (ANSI)
- B. American Water Works Association (AWWA)
- C. American Society for Testing Materials (ASTM)
- D. NSF/ANSI Standard 61
- E. Underwriters Laboratories (UL)
- F. International Organization for Standardization (ISO)
- G. Factory Mutual Research Corporation
- H. 1996 Safe Drinking Water Act
- I. Ductile Iron and Gray Iron Pipe and Fitting

Handbook of Cast Iron Pipe - Cast Iron Pipe Research Association (CIPRA)	CIPRA Standard for Flanged Pipe With Threaded Flanges
ANSI A21.4/AWWA C104	Cement-Mortar Lining for Ductile Iron and Gray Iron Pipe and Fittings for Water
ANSI A21.10/AWWA C110	Ductile Iron and Gray Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids
ANSI A21.15/AWWA C115	Flanged Ductile Iron and Gray Iron Pipe With Threaded Flanges
ANSI A21.50/AWWA C150	Thickness Design of Ductile Iron Pipes
ANSI A21.51/AWWA C151	Ductile Iron Pipe Centrifugally Cast in Metal Molds and Sand Lined Molds for Water and Other Liquids
ANSI B1.20	Pipe Threads, General Purpose (Inch)
ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings
ANSI B18.2.1	Square and Hex Bolts and Screws Inch Series, Including Hex Cap Screws and Lag Screws
ANSI B18.2.2	Square and Hex Nuts
ASTM A126	Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A307	Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A354	Specification for Quenched and Tapered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners
ASTM A536	Ductile Iron Castings
ANSI/AWWA C606	Grooved and Shouldered Joints



J. Plastic Pipe and Fittings

ASTM D1784	Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (PVC) Plastic Pipe Schedule 80
ASTM D1785	Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120
ASTM D2464	Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2467	Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2564	Solvents Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
ASTM D2672	Solvent Cement Joint Sockets or Belled PVC Pressure Pipe

K. Steel Pipe and Fittings

ASTM A53	Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless
ASTM A120	Pipe, Steel, Black and Hot-Dipped, Zinc Coated (Galvanized) Welded and Seamless for Ordinary Uses
ASTM A181	Forgings, Carbon Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless for Ordinary Uses
ASTM A183	Carbon Steel Track Bolts and Nuts
ASTM A234	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
AWWA C200	Steel Water Pipe and Fittings for Pipe 6-inch Inside Diameter and Larger
AWWA C203	Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape-Hot Applied
AWWA C205	Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4-inch and Larger - Shop Applied
AWWA C206	Field Welding Joints in Steel Pipe
AWWA C208	Steel Fittings

L. Other

ASTM A47	Malleable Iron Castings
ASTM A338	Malleable Iron Flanges, Pipe Fittings and Valve Parts for Railroad, Marine, and Other Heavy Duty Service at Temperatures up to 650 degrees F (345 degrees C)
ASTM E84/NFPA 225/ UL 723	Surface Burning Characteristics of Building Materials

1.04 SUBMITTALS

- A. Submit under provisions of Section 01331.
- B. Product Data - Provide data, indicating conformance to reference codes, pipe material, sizes, class, dimension, joint type, and accessories.

- C. Layout Drawings - Show complete piping layout, including materials, sizes, classes, locations, and dimensions.
- D. Results of shop tests, if required.
- E. Manufacturer's Certification - Certify that products meet or exceed specified requirements.
- F. Submit certificate of compliance with NSF/ANSI Standard 61 for all products under this section, including interior coatings, by an independent, authorized laboratory.
- G. 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.

#### 1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Thermoplastic pipe shall be stored on the job site in accordance with AWWA M23 and the manufacturer's recommendations. Thermoplastic pipe that has been subjected to excessive ultraviolet radiation from the sun shall not be used. Noticeably faded materials shall not be installed and shall be promptly removed from the site.
- B. Store thermoplastic pipe in the field by supporting the pipe uniformly per AWWA M23. Do not stack the pipe higher than 1.22 m (4 feet) or with weight on the bell ends. Cover stored thermoplastic pipe to protect it from the sun's ultraviolet radiation. Pipe that has been contaminated with any petroleum products (inside or outside) shall not be installed.
- C. 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.
- D. 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. All thermoplastic pipe shall be handled with padded slings or other appropriate equipment. The use of cables, hooks or chains will not be permitted.
- E. 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.
- F. Interiors of pipe, fittings, and accessories shall be kept free from dirt and foreign matter.
- G. Store pipe and fittings on heavy wood blocking or platforms so they are not in contact with the ground.
- H. 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.
- I. 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 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.

#### 1.06 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01780.

## 1.07 REGULATORY REQUIREMENTS

- A. Conform to the requirements of regulatory agencies having jurisdiction over the Work.

## 1.08 FIELD MEASUREMENTS

- A. Prior to start of construction, verify the field measurements and elevations that existing conditions and piping are as shown on Drawings. Notify ENGINEER of specific differences.
- B. When connecting to an existing flange, CONTRACTOR shall verify bolt pattern and alignment and shall coordinate accordingly.

## 1.09 COORDINATION

- A. Coordinate work under provisions of Sections 01310 and 01520, including field engineering.
- B. Coordinate the work with OWNER where effecting operation of existing structures, pumping stations, and treatment facilities.

# PART 2 PRODUCTS

## 2.01 GENERAL

- A. All products included in this section shall conform to the requirements of the standard specifications referenced herein.
- B. Pipe material, pipe class and pipe sizes shall be furnished and installed as listed herein, in the pipe schedule, or as shown on the Drawings.
- C. All pipes and fittings shall be as shown on the Drawings or as listed in pipe schedule, except as follows:
  - 1. Air pipe shall be stainless steel.
  - 2. Gas pipe shall be steel, Schedule 80 minimum.
  - 3. Chlorine solution and chemical feed pipe shall be solvent weld socket joint polyvinyl chloride (PVC).
  - 4. Potable and non-potable water pipe 3 inches or less in diameter shall be copper.
- D. The inside process piping system shall be installed as shown on the Drawings.
- E. All products, including interior coatings shall be suitable for use in a potable water system.
- F. All products, including wetted parts, shall be certified to meet NSF/ANSI Standard 61.
- G. All pipe, fittings, and accessories must be new materials in first-class condition. Used or recycled materials shall not be allowed, regardless of condition.

## 2.02 MATERIALS - DUCTILE IRON

- A. General
  - 1. Pipe material, sizes, classes, etc. shall be furnished and installed as listed herein and in the pipe schedule or as shown on the Contract Drawings.
  - 2. Ductile iron pipe material minimum rated water pressure of 250 psi and minimum Class 53.
  - 3. All ductile iron pipe shall be provided from the same manufacturer.
  - 4. Pipe shall be fully gauged.
  - 5. Pipe shall be furnished in nominal laying lengths of 18 or 20 feet unless otherwise specified.

6. Ductile iron pipe and fittings for all potable and non-potable water lines shall be double cement lined and seal coated inside and out 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.
  7. All ductile pipe and fittings used as process pipe shall be lined and coated with asphaltic material, minimum 1 mil thick in accordance with ANSI/AWWA C104/A21.4.
  8. 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. Ductile Iron Flanged Pipe with Threaded Flanges - AWWA C151/ANSI A21.51: Ductile iron pipe material minimum rated water pressure of 150 psi and minimum Class 53.
1. 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.
  2. 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.
  3. Flanged pipe shall be minimum Class 53 thickness and shall be furnished in standard laying lengths as specified or required.
  4. Manufacturer:
    - a. American Cast Iron Pipe Co.
    - b. Clow - A Division of McWane, Inc.
    - c. US Pipe.
    - d. Fast Fabricators, Inc.
- C. Ductile Iron Flanged Fittings:
1. 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.
  2. Reducers shall be eccentric unless otherwise specified.
  3. Manufacturer:
    - a. American Cast Iron Pipe Co.
    - b. Clow - A Division of McWane, Inc.
    - c. Griffin.
    - d. Sigma Corp.
    - e. Tyler - A Division of McWane, Inc.
    - f. Union Foundry Co., A Division of McWane, Inc.
    - g. US Pipe.
- D. Joints - Fittings shall be furnished with flanged joints. The type of joint shall meet the following applicable requirements:
1. Flanged Joint
    - a. No raised surface is allowable on cast iron flanges. Flanges shall be 125-lb. ASA flanges rated for a maximum working pressure of 250 psi.
    - b. The fittings shall be of standard lengths given under the ANSI B16.1, unless otherwise noted.
    - c. The pipe lengths shall be fabricated to meet the requirements of the Drawings.
    - d. Manufacturers
      - 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.

- e. 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.
  - f. 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.
  - g. 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 or fluorocarbon coated as specified herein.
- E. Coatings, Linings, and Polyethylene Encasement
- 1. Coatings and Linings for Ductile Iron Joint Pipe and Fittings
    - a. 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.
    - b. Ductile iron pipe and fittings shall be coated on the outside with a bituminous coating, approximately 1 millimetre thick. Fittings may be lined with an NSF/ANSI Standard 61 approved fusion bonded epoxy meeting the applicable sections of AWWA C116.
    - c. 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.

## 2.03 MATERIALS - PLASTIC

- A. PVC Pipe – 8 inches or less in diameter ASTM D1785, Type 1, Grade 1 (PVC 1120) PVC pressure pipe material conforming to ASTM D1784 Class Schedule 80, solvent cement socket weld-type joints shall be used on pipe runs and fittings to be PVC.
- B. All PVC pipe, fittings, and accessories must be new materials in first-class condition. Used or recycled materials will not be allowed, regardless of condition.
- C. Joint sockets for belled PVC pressure pipe to conform to ASTM D2672 and ASTM D2564 (solvent cements).
- D. Socket-type fittings for Schedule 80 PVC pipe pressure pipe to conform to ASTM D2467.
- E. Plastic Pipe Unions - shall be provided on PVC piping:
  - 1. At all connections to equipment, tanks and valves; at all wall and floor penetrations; and as otherwise shown on the Contract Drawings.
  - 2. All piping and fittings shall be of the same color and provided by the same manufacturer.
  - 3. All threaded unions on the chemical piping lines shall have splash guards.
  - 4. Splash guards shall be constructed of PVC material and shall be installed such that any leakage is directed away from the space occupied by personnel.

## 2.04 MATERIALS - STEEL

- A. Steel Process Pipe - AWWA C200 steel water or process pipe, material conforming to minimum Schedule 40, Grade B.
- B. Longitudinal joints shall be shop welded and shall be made either with straight seams having not more than two to each circumference, or shall be made by the spiral-weld process.
- C. The steel pipe shall be designed for minimum rated pressure of 150 psi internal pressure, including any live loads.
- D. Pipe ends shall be one of the following types:
  - 1. Type 1 - Square end rounded and true, shall be used with mechanically coupled field joints.

2. Type 2 - Beveled ends shall be used for field welded joints. Plain end pipe shall be beveled on the outside at an angle of 30 degrees with a root face at the end of the pipe of 1/16-inch, with the allowance of  $\pm 1/32$ -inch. This angle is measured from a line drawn perpendicular to the axis of the pipe.
- E. Fittings - The steel fittings shall conform to the AWWA standard C208 for dimensions for fabricated steel water pipe fittings, or as shown on the Drawings.
  - F. Fittings 2 inches and less shall be screwed, banded 150 malleable iron conforming to ASTM A338.
  - G. For sizes 2-1/2 inches and larger, fittings shall be butt welded conforming to ASTM A234.
  - H. Flanges shall be provided, at a minimum, on steel piping: at all connections to valves, equipment and tanks; at all wall and floor penetrations; and as otherwise shown on the Drawings.
    1. Forged steel welding neck flanges or slip-on welding flanges with plain face and smooth surface shall be used.
    2. All flanges shall be 150-lb. ASA flanges conforming to ASTM A181.
    3. Flanges of pipes and fittings, if they are warped, shall be corrected in the proper manner acceptable to the ENGINEER.
  - I. Joints - Pipe joints and fittings shall be made with either screwed, flanged, or butt-weld, or a combination of the three at the option of the CONTRACTOR. No grooved end pipe couplings will be allowed on steel piping. Joints within process tanks shall be made up of screwed-on flanges. Screwed joints without flanges will not be allowed within process tanks.
    1. Pipe joined by welding shall be made by a single butt-weld made on the outside of the pipe, butt-weld shall conform to the AWWA Standard C206 for field welding of steel water pipe.
    2. Mechanical joints shall be made with mechanical couplings of the sleeve type and shall be equal to Style 38 steel couplings for plain end steel pipe manufactured by the Dresser Manufacturing Company, or equal. Joint harnesses of approved design shall be furnished for use over the coupling joints, and shall be adequate for resisting the thrust resulting from the specified field test pressure. Location of such couplings and harnesses are as shown on the Drawings.
  - J. All steel pipe and fittings used for process piping shall be lined and coated with coal tar enamel, hot applied in accordance with AWWA C203.
    1. Steel pipe shall receive a prime coat of Type B primer.
    2. Finish Coat
      - a. Steel Pipe Interior - The prime coat shall be followed by a hot coat of coal tar enamel Type I.

## 2.05 MATERIALS - COPPER

- A. Copper Pipe - ASTM B88, Type L material for inside service.
- B. Fitting shall be socket-type fittings in conformance with ASME/ANSI B16.18.
- C. Joints - Copper joints shall be soldered with a lead free solder conforming to ASTM B32.

## 2.07 JOINTS IN PIPING

- A. Flanged Joints
  1. Shall be brought to exact alignment and all gaskets and bolts or studs inserted in their proper places.
  2. Bolts or studs shall be uniformly tightened around the joints.
  3. Where stud bolts are used, the bolts shall be uniformly centered in the connections and equal pressure applied to each nut on the stud.

4. Pipes in all lines subject to temperature changes shall be cut short and cold sprung into place to compensate for expansion when hot.
  5. Gaskets shall be ring type, minimum 1/16-inch thick, cloth inserted rubber gaskets.
  6. Flanges shall conform to AWWA Standard C115 (ANSI A21.15) with bolts provided in the size and number called for and in accordance with the American Standard with hexagonal nuts.
  7. For bolt sizes and lengths, the "Handbook of Cast Iron Pipe" should be consulted.
  8. Each flanged joint shall have a bead of silicone caulk applied to the full perimeter of the joint after finish painting is completed.
- B. Screwed Joints
1. All screwed joints shall have threads conforming to ANSI B2.1, made with the appropriate paste of jointing compound, depending on the type of liquid to be processed through the pipe.
  2. All pipe up to and including 1-1/2 inches diameter shall be reamed to remove burr and stood on end and well pounded to remove scale and dirt.
  3. Wrenches on valves and fittings shall be applied directly over the joint being tightened.
  4. Pipe in all lines subject to temperature changes shall be cut short and cold sprung into place to compensate for expansion when hot.
  5. Joints in all piping used for chlorine gas lines shall be made up with glycerin.
  6. Joints in plastic piping shall be made with compounds recommended by the manufacturer.
- C. Welded Joints
1. Shall be made by competent operators in a first-class workmanlike manner, in complete accordance with ANSI Standard B31.1. Welding electrodes shall conform to ANSI Standard W3.1, and welding rod shall conform to ANSI Standard W3.2.
  2. Only skilled welders capable of meeting the qualification tests for the type of welding, which they are performing, shall be employed.
  3. Tests, if ordered by ENGINEER or otherwise required, shall be made at the expense of the CONTRACTOR.
- D. Solvent-Welded Joints
1. In plastic piping shall be accomplished in strict accordance with the pipe manufacturer's recommendations, including necessary field cutting, sanding of pipe ends, joint support during setting period, etc.
  2. Care shall be taken that no droppings or deposits of adhesive or solvent material remain inside the assembled piping.
  3. Solvent material shall be compatible with the pipe itself, being a product approved by the pipe manufacturer.
  4. Solvent cement for PVC piping shall be resistant to the chemicals carried by the PVC piping for which it is being used and shall conform to ASTM Specification D2564 or other applicable ASTM specifications.
  5. CONTRACTOR shall submit written certification from the solvent cement manufacturer that the cement is compatible with the chemicals carried by the PVC piping for which it is being used. Certifications are not required for PVC pipe carrying water or organic polymers. Certification shall be supplied prior to the use of the cement.
- E. No-Hub Joints - Fittings and all parts of the clamp assembly used in joining "hubless cast iron sanitary systems" for soil, waste, vent and house or 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 301-69T and ASTM Standard C564.

## 2.08 OUTSIDE COATINGS

- A. All exposed steel and cast or ductile iron piping shall receive a rust-inhibitive shop primer plus cover coats in accordance with Section 09900.



1. Surfaces to be painted shall be prepared in a workmanlike manner with the objective of obtaining a smooth, clean and dry surface.
2. Rust, dust, scale, oil, grease, as well as all other loose or foreign substances, including weld blisters, fins, and burrs shall be removed by cleaning, wire brushing, chipping, or sandblasting.
3. To prevent new rusting, cleaned surfaces shall be painted immediately after cleaning.
4. Surfaces located within 2 inches of joints, which are to be field welded, shall be left unpainted.

## 2.09 HANGERS AND SUPPORTS

- A. All piping shall be adequately supported and braced by means of adequate hangers, concrete piers, pipe supports, brackets, or otherwise as may be required by the location. Refer to Section 15150.

## 2.10 SLEEVES

- A. All piping passing through walls and floors shall be installed as shown on the Contract Drawings.
- B. Piping installed directly into the wall shall be accurately located before concrete is poured.
- C. All piping installed in sleeves or wall castings shall be accurately located before concrete is poured, or placed in position during construction of masonry walls.
  1. Sleeves passing through floors shall extend from the bottom of the floor to a point 3 inches above the finished floor, unless shown otherwise.
  2. Waterstop flanges are required on all sleeves located in floors or walls, which are continually wet, or under hydrostatic pressure on one or both sides of the floor or wall and on all sleeves penetrating walls of areas designed on the Drawings as "gastight."
  3. Sleeves shall be black steel pipe, or fabricated steel in accordance with details shown on the Drawings.
  4. If not shown on the Drawings, the CONTRACTOR shall submit to the ENGINEER the details of the sleeves he proposes to install.
  5. Steel sleeves shall be fabricated of structural steel plate in accordance with the standards and procedures of AISC and AWS.
  6. All steel wall and floor sleeves shall receive a commercial sandblast cleaning, and all surfaces shall be painted in accordance with Section 09900.
  7. The annular space between the installed piping and sleeve shall be completely sealed against a maximum hydrostatic (or gas) pressure of 20 psig with a modular mechanical-type seal consisting of interlocking synthetic rubber links connected by stainless steel bolts and nuts with pressure plates under each end.
  8. Tightening the bolts shall compress the neoprene lines causing them to expand and form a continuous, airtight, watertight seal between pipe and sleeve. The seal shall be "Link-Seal," as manufactured by the Thunderline Corporation, Wayne, MI; or equal.
  9. Seal type, size and installation thereof shall be in strict accordance with the manufacturer's recommendations.
  10. In general, sleeves installed in walls, floors or roofs against one side of which will develop a hydrostatic (or gas) pressure, or through which leakage of liquid will occur, shall be so sealed.
  11. Refer to standard details as shown on the Drawings for wall, floor and deck sleeve details.

## 2.11 PIPE ACCESSORIES

- A. Fittings - Same materials, class, coatings and linings as pipe unless under Article 2.02 it was specifically described otherwise. Fittings molded or formed to suit pipe size and end design and in required tee, bends, elbow, couplings, adapters and other configurations.
- B. Where piping is to be installed above ground or within structures, provide adequate supports and bracing by means of hangers, brackets or concrete supports as may be required by the location.



- C. Pipe openings in walls shall be precast or core drilled and completely sealed against water seepage with a mechanical type seal consisting of interlocking synthetic rubber links and nuts with pressure plates wider at ends, the seal shall be a link seal manufactured by Thunderline Corporation, Wayne, MI, or equal.

## 2.12 IDENTIFICATION

- A. 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.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. CONTRACTOR shall verify all existing conditions.
- B. CONTRACTOR shall verify that structures are complete enough to receive pipe.
- C. All pipe or fittings which have been damaged in transit or which are obviously deformed or refinished in any way shall be rejected, marked and removed from the site of the work.
  - 1. Any pipe or fitting which the ENGINEER suspects is improper for the job shall be temporarily rejected, marked and set aside for subsequent investigation to determine its conformity with the specifications.
  - 2. All pipe fittings and specials shall be carefully inspected in the field before installation. Cracked, broken, warped, out-of-round, damaged pipe joints including damaged pipe lining or coatings or specials, as determined by the ENGINEER, shall be culled out and not installed.
    - a. 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.

### 3.02 INSTALLATION

- A. All piping shall be installed by skilled workmen in accordance with the best standard practice for piping installation, and in accordance with the manufacturer's installation instructions where applicable.
  - 1. Proper tools and appliances for the safe and convenient handling and installing of the pipe and fittings shall be used.
  - 2. Great care shall be taken to prevent any pipe coating from being damaged on the inside of the pipe and fittings. All pieces shall be carefully examined for defects and no piece shall be installed which is known to be defective.
  - 3. If any defective pieces should be discovered after having been installed, it shall be removed and replaced with a sound one in a satisfactory manner by the CONTRACTOR and at his own expense.
  - 4. Pipe and fittings shall be thoroughly cleaned before they are installed and shall be kept clean until they are accepted in the complete work.
  - 5. All piping connections to equipment or tanks shall be provided with unions or coupling flanges located so that piping may be readily dismantled from the equipment or tank.
  - 6. At certain applications, Dresser or victaulic couplings may also be used, subject to the ENGINEER's approval.
  - 7. All piping shall be installed in such a manner that it will be free to expand and contract without injury to itself or surrounding structures or equipment.

8. All piping shall be erected to accurate lines and grades and shall be supported and braced against movement temporary or permanent.
  - B. Where process piping assemblies connect to equipment, valves or tanks, such piping shall be rendered compatible with the approved equipment, valve or tank installed and any necessary modifications to the original piping shall be shown in scaled layout on appropriate shop drawings submitted to the ENGINEER.
  - C. Piping assemblies under 4-inch size shall be essentially supported on walls and ceilings, unless otherwise shown on the Drawings, being kept clear of openings and positioned above “headroom” space; where practical, such piping shall be run in neat clusters, plumb and level along walls, and parallel to overhead beams.
- 3.03 TESTING
- A. All piping shall be tested in accordance with Section 15140.
- 3.04 PIPING SCHEDULE
- A. Piping requirements for this project are outlined in the schedule, which appears at the end of this section.
- 3.05 FLUSHING CONNECTIONS
- A. Each flushing connection shall consist of an eccentric blind flange tapped for 1-1/2-inch minimum IPS with a reducing bushing to 1-inch IPS, a 1-inch short nipple, and a 1-inch gate valve. Each gate valve on the flushing connections shall be provided with a 1-inch IPS to 1-inch quick disconnect female hose coupler.
    1. Female hose couplers shall be provided with appropriate threads or adapters and any necessary nipples to make a leakproof seal when attached to the gate valves.
    2. Hose couplers shall be Ever-Tite, OPW Kamlock, or equal.
- 3.06 COUPLINGS AND ADAPTERS
- A. Flanged adapters shall be used to join process piping to all pump flanges.
    1. Adapters shall be restrained to process piping by the use of tie rods.
    2. Couplings and/or adapters shall be provided by the CONTRACTOR for the alignment of similar types of pipe or connecting dissimilar pipe materials as required in accordance with the detail shown on the Drawings.
    3. Unions shall be provided adjacent to all pumps, tanks, valves and other pieces of equipment where soldered or screwed joints are utilized.
    4. Provide couplings and flanged adapters as required and in accordance with this clause.
    5. Where couplings and adapters are to be used they shall be installed in complete accordance with the manufacturer’s recommendations.
    6. Refer to Section 15120 for further information on couplings and adapters.
- 3.07 EXPANSION JOINTS
- A. Expansion joints shall be installed on all piping and conduit wherever such piping crosses a structural expansion joint.
    1. A 1/8-inch gap shall be left between adjacent lengths of pipe with a Dresser Style 38, Smith-Blair, or equal coupling joining the piping.
    2. Piping shall be supported by pipe supports each side of the expansion joint as shown on the Drawings so that the coupling transmits no loads.
    3. CONTRACTOR shall provide permanent restraints for all expansion joints installed on piping.
    4. Restraints shall keep pipe from separating when subjected to pressures up to 250 psig.

5. Permanent restraints shall consist of tie rods and straps or welded clip angles as shown on the Drawings.
6. Permanent restraints shall also be furnished and installed on piping at adjacent pipe supports to prevent any longitudinal movement.
7. All restraint hardware to be supplied and installed in accordance with manufacturer's recommendations.

**INSIDE PROCESS PIPING SCHEDULE**

IDENTIFICATION OF PIPELINE	DIAMETER(S)	TYPE OF PIPE	SCHEDULE OR CLASS OF PIPE	TYPE OF PIPE JOINT <sup>(1)</sup>	TESTING PRESSURE	REMARKS
Sludge Thickener Overflow	6", 10"	DIP (cement lined)	53	Flanged	150 psi	Cement Lined
Distribution Box Inflow and Effluent	6"	DIP (cement lined)	53	Flanged	150 psi	Cement Lined
Thickened Sludge Pump Discharge	6"	DIP (cement lined)	53	Flanged	150 psi	Cement Lined
Belt Filter Press Drain	12"	DIP (cement lined)	53	Flanged	150 psi	Cement Lined
Effluent Water Pipe	2"	Copper	L	Soldered	NA	--
Polymer Feed Pipe	2"	PVC	Schedule 80	Solvent	NA	--

(1) Solvent welded joints shall be constructed with solvent glues compatible with the chemical(s) in the piping. CONTRACTOR shall submit evidence of chemical compatibility.

(2) Piping, appurtenances, and fittings shall be disinfected in accordance with Section 15140.

END OF SECTION

## SECTION 15100

### VALVES AND APPURTENANCES

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. Scope - CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install valves and appurtenances, complete and operational.
- B. Related Sections
  - 1. Section 01331 - SHOP DRAWING PROCEDURES.
  - 2. Section 01520 -TEMPORARY CONSTRUCTION FACILITIES.
  - 3. Section 01780 - RECORD DOCUMENTS.
  - 4. Section 02351 - EXCAVATION, BACKFILL, AND TRENCHING.
  - 5. Section 09900 - PAINTING.
  - 6. Section 15060 - INSIDE PROCESS PIPING.
  - 7. Section 15120 - PIPING SPECIALTIES AND ACCESSORIES.

##### 1.02 REFERENCES

- A. Standards referenced in this section are listed below:
  - 1. ANSI B16.1, Cast-Iron Pipe Flanges and Flanged Fittings.
  - 2. ANSI B16.34, Valves-Flanged, Threaded and Welding end. (ASME B16.34).
  - 3. ANSI B16.4, Cast Iron Fittings
  - 4. ASTM A 126, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
  - 5. ASTM A193/A193M, Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
  - 6. ASTM A194/A194M, Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service, or Both.
  - 7. ASTM A240/A240M, Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
  - 8. ASTM A276, Specification for Stainless Steel Bars and Shapes.
  - 9. ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
  - 10. ASTM A351/A351M, Specification for Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts.
  - 11. ASTM A354, Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs and Other Externally Threaded Fasteners
  - 12. ASTM A380, Practice for Cleaning, Descaling and Passivation of Stainless Steel Parts, Equipment and Systems.
  - 13. ASTM A436, Standard Specification for Austenitic Gray Iron Castings 8.
  - 14. ASTM A536, Specification for Ductile Iron Castings.
  - 15. ASTM A564/A564M, Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes.
  - 16. ASTM A743/A743 M, Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.
  - 17. ASTM B21/B21M, Specification for Naval Brass, Rod, Bar, and Shapes.
  - 18. ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
  - 19. AWWA C500, Standard for Metal-Seated Gate Valves for Water Supply Service.
  - 20. AWWA C504, Rubber-Seated Butterfly Valves.
  - 21. AWWA C507, Ball Valves, 6-inch through 48-inch.
  - 22. AWWA C508, Swing-Check Valves for Waterworks Service, 2-Inch through 24-Inch NPS.
  - 23. AWWA C509 Standard for Resilient Seated Gate Valves for Water Supply Service.
  - 24. AWWA C540, Power-Activating Device for Valves and Sluice Gates.

25. AWWA C550, Protective Interior Coatings for Valves and Hydrants.
26. AWWA C800 Underground Service Line Valves and Fittings.
27. American Gear Manufacturers Association (AGMA) Standards.
28. NEMA National Electrical Manufacturer's Association.
29. NEC National Electric Code.
30. NSF/ANSI Standard 61.
31. Underwriter's Laboratories (UL).
32. International Organization for Standardization (ISO).
33. Factory Mutual Research Corporation.
34. 1196 Safe Drinking Water Act.
35. Manufacturing Standardization Society of the Valve and Fittings Industry (MSS).

### 1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
  1. Manufacturer shall have a minimum of five years of experience producing substantially similar equipment and able to show evidence of at least five installations in satisfactory operation for at least five years.
  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. Component Supply and Compatibility:
  1. Obtain all equipment included in this section, regardless of the component manufacturer, from the valves and appurtenances manufacturer.
  2. The valves and appurtenances equipment manufacturer to review and approve or prepare all Shop Drawings and other submittals for all components furnished under this section.
  3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the valves and appurtenances equipment manufacturer.

### 1.04 SUBMITTALS

- A. Shop Drawings: Submit for approval the following:
  1. Manufacturer's literature, illustrations, specifications, detailed drawings, data, descriptive literature, identification of materials of construction of all parts on all valves and appurtenances.
  2. Deviations from Drawings and Specifications.
  3. Engineering data including dimensions, materials, size and weight.
  4. Fabrication, assembly, installation and wiring diagrams.
  4. Cv values and headloss curves.
  5. Control characteristics of modulating valves.
  6. Certificates of compliance with AWWA Standards, where applicable.
  7. Corrosion resistance information to confirm suitability of the valve materials for the application. Information on chemical resistance of elastomers shall be furnished from the elastomer manufacturers.
  8. Power and control wiring diagrams, including terminals numbers for electric actuators.
  9. Complete nameplate data of valves and electric actuators.
  10. Special tools list.
- 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.
  2. Furnish operation and maintenance manuals in conformance with the requirements of Section 01781, Operation and Maintenance Data.

- C. Shop Tests
  - 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 - 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 - CONTRACTOR must provide manufacturer's test specifications for all tapping sleeve and valves prior to field testing.
- G. Certified copies of shop test results and inspection data.

#### 1.05 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

#### 2.01 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 specified in Sections 02698 and 15060.
  - 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.
  7. Unless otherwise specified all flanged valves shall have ends conforming to ANSI B16.1, Class 150.
  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. Valve size, type of valve, joint type, class, lining, coatings shall be installed as listed herein or as shown on the Contract Drawings.
  - C. Valves shall be of standard manufacturer and of highest quality, both as to material and workmanship, conforming to the latest edition of AWWA standards specified.
  - D. All valves shall be provided with flange or screwed ends as described herein or shown on the Contract Drawings.
  - E. Valves, 2 inches in nominal diameter and smaller shall be all brass or bronze unless thermoplastic, stainless steel, or iron valves are specifically called for in the specifications or drawings or are required for the given service.
  - F. Valves over 2 inches in nominal diameter shall be iron bodied, fully brass or bronze mounted unless thermoplastic valves are specifically called for in the specifications or drawings or are required for the given service.
  - G. All surface forming joints or bearing surfaces shall be machined to a perfect fit.
  - H. All disc and seat rings shall be carefully and thoroughly secured in place with the iron castings machined where the rings are bare and the backs of the rings machined all over.
  - I. After the rings have been fastened securely in place, the front shall be machined all over to a perfectly true and smooth bearing surface.
  - J . All valves with non-rising stems shall have valve position indicators.
  - K. Manually operated valves, with or without extension stems, shall require not more than a 40-pound pull on the manual operator to open or close a valve against the specified criteria. The gear actuator and the valve components shall be able to withstand a minimum pull of 200 pounds on the manual operator and an input torque of 300-foot pounds to an actuator nut. Manual operators include handwheel, chain, crank, lever and a T-handle wrench.
  - L. Provide exposed valves with flanged ends conforming to ANSI B16.1. The pressure class of the flanges shall be equal to or greater than the specified pressure rating of the valves.
  - M. Provide buried valves with mechanical or push-on joints, restrained or unrestrained, as required by the piping with which they are installed.



- N. All materials of construction of the valves shall be suitable for the application as shown.
- O. Protect wetted parts from galvanic corrosion due to contact of two different metals.
- P. For stainless steel bolting, except where Nitronic-60 nuts are required, use anti-seize compound, graphite free, to prevent galling. Strength of the joint shall not be affected by the use of anti-seize compound.

## 2.02 PLUG VALVES

- A. Plug valves shall be non-lubricated, eccentric type and shall close drop-tight at the rated pressure of 150 psig.
- B. Port areas shall be rectangular and at least 100 percent of the full pipe area to provide clog-free operation.
- C. The valve body shall be cast iron or semi-steel with a welded-in-place nickel seat. The body shall have a bolted bonnet for permitting removal of the plug while body remains in line.
- D. Flanges shall be 125-lb., faced and drilled.
- E. The plug shall be cast iron with synthetic rubber facing, suitable for frequent open-close operation and for flow throttling.
- F. Journal bearings shall be provided at each end of the plug and shall be of the wetted type to prevent binding. Bearings shall be fabricated from oil-impregnated 316 stainless steel so that the plug will operate freely after long periods of inactivity.
- G. Packing shall be adjustable U-rings.
- H. Valves shall be provided with adjustable stops.
- I. Valves for interior installation and smaller than 8 inches in diameter shall be equipped with standard 2-inch nuts for wrench operation.
- J. Valves 8 inches in diameter and larger shall be equipped with worm gear and handwheels.
- K. Chain operators shall be furnished in accordance with chain wheel operators as stated hereinafter.
- L. Unless otherwise specified, valves shall be installed so that when closed, the plug is at the upstream end of the valve.
- M. In horizontal piping with the plug shaft installed horizontally, the plug shall be in the upper part of the valve body when open.
- N. Plug valves shall be as manufactured by DeZurik or Pratt.

## 2.03 THERMOPLASTIC BALL VALVES

- A. Thermoplastic ball valves shall be provided on chemical, supernatant sampling, and polymer piping lines, and other PVC lines, except at ends of chemical fill lines.
- B. All thermoplastic ball valves furnished are to be of the true union-full bore design and manufactured of PVC material with Teflon seats and viton seals.

- C. Pipe, fittings, and valves are to be of one manufacturer and of the same specified material in order to assure compatibility of system components.
- D. All thermoplastic ball valves shall be equipped with snap-on, snap-off handles.
- E. Manufacturers
  - 1. Asahi.
  - 2. Hayward

#### 2.04 STAINLESS STEEL BALL VALVES

- A. Stainless steel ball valves shall be provided at ends of the distribution box drain lines.
- B. Stainless steel ball valves shall have flanged end connections and shall be rated for 150-lb. service.
- C. Valves shall be lever operated.
- D. Valves shall be Type 316 stainless steel with Teflon ball seats, packing and stem steel.
- E. Manufacturer - Ladish or equal.

#### 2.05 GATE VALVES

- A. Gate valves 2 inches and smaller shall be bronze gate valves with rising stem, double wedge disc, screwed bonnet, screwed ends, 125-pound rating and shall be repackable under pressure in full open position.
- B. All gate valves 2 inches and smaller shall be Stockham Figure B100; Hammon Figure 1B640; or equal.
- C. All resilient seated gate valves shall be as manufactured by Kennedy Valve Manufacturing, Mueller, or equal.
- D. All resilient seated gate valves shall provide a full pipe opening when fully opened.
- E. All other interior gate valves shall conform to AWWA Standard C509 and shall be of iron body, bronze mounted, resilient seat type with outside screws and yokes and have 125 pound ANSI flanged ends.
  - 1. Valves shall be constructed with bolted bonnets, provided with cast iron stuffing boxes having bolted followers.
  - 2. The stuffing boxes shall be so arranged as to be readily accessible and shall be packed ready for use with synthetic fiber, graphite impregnated stuffing.
- F. Stems shall be fabricated of brass or bronze with the lath-cut, half-V pattern threads. Resilient seat type gate valves shall be Kennedy Valve Manufacturing, Mueller, or equal.
- G. All interior gate valves shall be equipped with handwheel operators unless otherwise specified. Handwheel or chain and wheel operators shall be replaceable with 2 inch operating nuts without replacing the valve stem or removing the bevel gears.
- H. All buried valves shall be supplied with stainless steel bolts.

## 2.06 CHECK VALVES

- A. All check valves, except those installed on the washwater pump discharge piping, sump pump discharge piping, and chemical feed system piping shall be of the horizontal single disc swing type designed to operate with a minimum loss of pressure and comply with AWWA C508.
- B. Check valves shall be so designed that when there is no flow through the line, the disc shall hang lightly against the seat and shall afford ample waterway with but a small angle of opening.
- C. All check valves shall be provided with screwed or bolted covers for access to the disc.
- D. Unless shown otherwise, all check valves shall be located in horizontal piping runs and shall be provided with extended hinge pin and outside lever and weight fully installed to assist the valve in closing. Where shown on the Drawings, check valves shall be vertically mounted and shall provide the same functionality and be suitable for vertical installation.
- E. All check valves with outside lever and weights shall be provided with guards/cages which protect operating personnel from the swinging action of the outside lever and weights.
- F. Guards shall be of a cage-type design using heavy duty wire mesh, and easily removable.
- G. Check valves for chemical feed systems shall be PVC ball check valves as manufactured by Plast-O-Matic, ASAHI, Hayward, or equal.”
- H. Check valves on the discharge side of the Thickened Sludge Pumps shall be Golden Anderson Model 200-D, DeZurik Series 100, or equal.
- I. In addition to the requirements in Article 2.10, check valves on the discharge side of the Wash-water pumps shall be AWWA C508 compliant, NSF 61 compliant and lead free. Valve shall be iron bodied, stainless steel seat, stainless steel fasteners, shafts and pivots, and be provided with a fusion bonded epoxy coating inside and out. Provide check valves with a suitably sized, externally mounted, adjustable, air cushioning dashpot to prevent slamming of the valve. The check valves shall be Golden Anderson Model 250-D, DeZurik Series 250, or equal.

## 2.07 BUTTERFLY VALVES

- A. All butterfly valves shall be cast iron bodied flanged end with a resilient rubber seat.
- B. Provide lever actuators for valves 8 inches and smaller, self-locking traveling nut actuators with handwheel operators for valves 10-inch through 16-inch in size, and worm gear actuators with handwheel operators for valve 18 inches and larger, unless otherwise specified herein or shown on the Contract Drawings or unless chain and wheel operators are required per subsequent Articles.
- C. Worm gear actuators shall be as manufactured by Limitorque, EIM, Pratt, DeZurik, or equal.
- D. All butterfly valves shall have:
  - 1. Cast iron bodies.
  - 2. Cast iron vanes conforming to ASTM A126, Class B with stainless steel Type 316 seating edge, or cast iron vanes conforming to ASTM A48 Class 40 with stainless steel Type 316 seating edge.
  - 3. Full-length Type 316 stainless steel valve shafts with permanently-lubricated nylon or Teflon bearings.
  - 4. Non-wafer-type flanged end construction.
  - 5. Minimum working pressure in accordance with Article 1.04.
  - 6. Resilient rubber seats of Buna N compound.
  - 7. Design and construction complying with AWWA Standard C504.

8. Actuators as specified; lever actuators for valves 8 inches and smaller shall be ratchet type.
9. Valve position indicators.

E. Butterfly valves shall be as manufactured by DeZurik, Pratt, or equal.

## 2.08 APPURTENANCES FOR EXPOSED METALLIC VALVES

### A. General

1. For valves located with center of shaft 6-1/2 feet or less above the operating floor, provide levers on 4-inch quarter turn valves and handwheels on all other valves, unless otherwise shown or specified.
2. For valves located with center of shaft 6-1/2 feet or higher above the operating floor, provide chain operators. The length of the operating chain shall extend to 6 feet 0 inches above the operating floor.
3. Where indicated, provide extension stems and floorstands.

### B. Handwheels

1. Conform to the applicable AWWA Standards.
2. Material of Construction: Bronze or cast iron.
3. Arrow indicating direction of opening and word "OPEN" shall be cast on the trim of the handwheel.
4. Maximum Handwheel Diameter - 30 inches.

## 2.09 VALVE TAGS AND DIRECTORY

A. Provide valve tags for all valves.

B. Tags shall be made from a plastic laminate of heavy plastic with a brass eyelet in the corner and shall indicate the valve number and fluid in the pipe.

C. Tags shall be fastened to each valve with a brass chain.

D. Tags to be made by Seton Name Plate Company, New Haven, Connecticut; W.H. Brady Company; or equal.

E. A valve directory shall be provided listing all valve numbers, the valve function, and location. The directory shall be typewritten and framed with a glass cover and delivered to the OWNER after approval by the ENGINEER.

## 2.10 PAINTING OF EXPOSED VALVES AND APPURTENANCES

A. Exterior steel, cast-iron, and ductile iron surfaces, except machined surfaces of all exposed valves and appurtenances, shall be finish painted in the shop. The surface preparation, priming, finish painting, and field touch-up painting shall conform to the requirements of Section 09900, Painting.

### B. 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.

## 2.11 BACKFLOW PREVENTER

- A. Reduced pressure zone backflow preventers shall be supplied where shown on the Drawings.
- B. The backflow preventers shall consist of two spring-loaded check valves and a spring-loaded diaphragm-actuated, differential pressure relief valve located in the zone between the check valves.
- C. The unit shall include properly located test cocks and operation shall be completely automatic. The total headloss shall not exceed 10 psi at AWWA rated flow.
- D. All parts shall be manufactured from corrosion-resistant materials.
- E. A continuous discharge from the relief valve opening shall provide a visual inspection of need of repair.
- F. Manufacturers - Reduced pressure zone backflow preventers shall be listed on approved list of University of California Foundation for Cross-Connection Control and Hydraulic Research (FCCCHR). Manufacturer shall provide documentation of FCCCHR listing.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that trench cut, excavated base and valve bedding or structures are ready to receive work and valve bedding dimensions and elevations are as indicated on drawings.
- B. All valves and appurtenances shall be carefully inspected in the field before installation. Cracked, broken, warped, out-of-round, damaged joints, including damaged linings or coatings, or otherwise defective valves, hydrants and stops, as determined by the ENGINEER, shall be culled out and not installed. Such rejected material shall be clearly tagged in such manner as not to deface or damage it, and the material shall then be removed from the job site by the CONTRACTOR at his own expense.
- C. For tapping sleeve and valve connections, the CONTRACTOR, prior to making any connections, shall verify the material and outside diameter of the existing water main.
- D. The CONTRACTOR shall have on the job site all the proper tools, gauges, pipe cutters, lubricants, etc., to properly install valves, hydrants, etc.
- E. The CONTRACTOR shall verify all valve positions and locations before installation.

### 3.02 PREPARATION

- A. Prior to installing the foundation, trenches shall have all water moved and all work performed in a dry stable trench.
- B. All valves, hydrants, etc. 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.

- C. Flat-bottom trenches of required width shall be excavated to the necessary depth as required and maintained in accordance with Section 02351.
- D. Bedding material shall be spread in maximum of 8-inch layers for the pipe foundation and each layer shall be compacted until the required total depth of bedding has been built up.
- E. Suitable holes or depressions shall be provided in the bedding to permit adequate bedding of bells, couplings or similar joint projections.
- F. Compaction methods include hand tamping with T-bars, flat heads, shovel slicing, as well as mechanical compactors.
- G. The CONTRACTOR shall perform his bedding operations with care to maintain line grade and proper depth of valve and hydrants.

### 3.03 LINES AND GRADES

- A. Easement and property line and other control lines necessary for locating the work are shown on the Drawings.

### 3.04 TOLERANCES

- A. Valves and appurtenances shall be laid to the lines and grades shown on the Drawings.
- B. Valves, backflow preventers and appurtenances shall be installed at the elevations and locations shown on the Drawings.

### 3.05 INSTALLATION

- A. Install all valves and appurtenances as shown on the Contract Drawings and in accordance with the manufacturer's instructions.
- B. Conform to appendices of AWWA Standards, where applicable.
- C. Install all valves so that operating handwheels or levers can be conveniently turned from operating floor without interfering with access to other valves and equipment, and as approved by the ENGINEER. Orient chain operators out of the way of the walking areas. Mount valves so that indicator arrows are visible from floor level.
- D. Install all valves plumb and level. Install all valves to be free from distortion and strain caused by misaligned piping, equipment or other causes.
- E. For buried valve installations, set valve boxes plumb and centered, with soil carefully tamped to a lateral distance of 4 feet on all sides of the box, or to the undisturbed trench face if less than 4 feet. Provide a flexible coupling next to a buried valve for ease of valve removal.
- F. All valves shall be kept in the closed position until otherwise directed by the ENGINEER.
- G. 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.
- H. The CONTRACTOR shall furnish slings, straps, and/or approved devices to provide satisfactory support of the valves or hydrants when lifted. Transportation from storage areas to the trench shall be restricted to operations which can cause no damaged to the coating or lining or castings.
- I. The valves or hydrants shall not be dropped from trucks onto the ground or into the trench.

- J. All valves shall be installed in accordance with the specifications for the pipe to which they are to be connected and as previously described for individual types of valves.
- K. Joints of valves shall be made up in accordance with the Contract Drawings and/or as described under the appropriate pipe joint descriptions found in other sections of these specifications.
- L. The valves shall be so located that they are accessible for operating purposes and shall bear no stresses due to loads from the adjacent pipe.
- M. All valves shall be inspected before installation, and they shall be cleaned and well lubricated before being installed in the line.

### 3.06 FIELD TESTS AND ADJUSTMENTS

- A. Adjust all parts and components as required to provide correct operation of the valves.
- B. Conduct a functional field test on each valve in the presence of the ENGINEER to demonstrate that each valve operates correctly.
- C. Demonstrate satisfactory opening and closing of valves at the specified criteria requiring not more than 40 lbs. effort on the manual actuators.
- D. Test 10 percent valves of each type by applying 200 lbs. effort on the manual operators. There shall be no damage to the gear actuator or the valve.

### 3.07 MANUFACTURER'S SERVICE

- A. Provide services of the equipment manufacturer or their approved representative in accordance with Section 01620.

### 3.08 TESTING

- A. Testing of all valves shall be performed in accordance with Section 15140.

END OF SECTION

## SECTION 15120

### PIPING SPECIALTIES AND ACCESSORIES

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. Work Specified - CONTRACTOR shall provide all labor, materials, equipment, tools, services, and incidentals necessary to furnish and install piping specialties and accessories as shown, specified and required. Included, but not limited to the following: couplings, repair clamps, joint clamps, service saddles, service fittings, water meter fittings, tile set, corporation stops, curb stops and curb boxes.
- B. Related Work Specified Elsewhere
  - 1. Section 02351 - EXCAVATION, BACKFILL AND TRENCHING.
  - 2. Section 09900 - PAINTING.
  - 3. Section 15060 - INSIDE PROCESS PIPING.
  - 4. Section 15100 - VALVES AND APPURTENANCES.
  - 5. Section 15150 - SUPPORTS AND ANCHORS.

##### 1.02 QUALITY ASSURANCE

- A. Manufacturer's Qualifications
  - 1. Manufacturer shall have a minimum of five years of experience in the production of substantially similar types of piping specialties specified and shall show evidence of satisfactory service in at least five installations.
  - 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, Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water.
  - 2. AWWA C115, American National Standard for Flanged Ductile-Iron Pipe with Ductile-Iron Pressure Pipe and Fittings.
  - 3. AWWA C301, Prestressed Concrete Pressure Pipe, Steel-Cylinder Type, for Water and Other Liquids.
  - 4. AWWA C600, Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances.
  - 5. AWWA C605, Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
  - 6. AWWA C651, Standard for Disinfecting Water Mains.
  - 7. AWWA C800, Underground Service Line Valves and Fittings.
  - 8. AWWA C900, Polyvinyl Chloride (PVC) Pressure Pipe, 4-inch through 12-inch for Water Distribution.
  - 9. ASTM A536, Standard Specification for Ductile Iron Castings.
  - 10. ASTM B92, Specification for Standard Size Seamless Copper Pipe.
  - 11. ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
  - 12. ASTM D2000, Standard Classification System for Rubber Products in Automotive Applications.
  - 13. NSF/ANSI Standard 61.
  - 14. Underwriter's Laboratories (UL).
  - 15. International Organization for Standardization (ISO).
  - 16. Factory Mutual Research Corporation.
  - 17. 1996 Safe Drinking Water Act.



### 1.03 SUBMITTALS

- A. Shop Drawings - Submit for approval the following:
  - 1. Manufacturer's literature, illustrations, specifications, detailed drawings, data and descriptive literature on all piping specialties.
  - 2. Deviations from Drawings and specifications.
  - 3. Engineering data including dimensions, materials, size and weight.
  - 4. Fabrication, assembly, installation and wiring diagrams.
- 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. 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.
- D. Delivery Tickets - Furnish delivery tickets indicating the manufacturer, accessory type and class, identifying that the equipment was new and from a manufacturer that has been submitted and approved.

### 1.04 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. Handle all materials very carefully. Materials, which are cracked, dented or otherwise damaged, will not be accepted.
- 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 piping specialties and accessories on heavy wood blocking or platforms as necessary so they are not in contact with the ground.
- F. Pipe, fittings, and specials shall be unloaded as necessary opposite to or as close to the place where they are to be used as is practical to avoid unnecessary handling.

## PART 2 PRODUCTS

### 2.01 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 piping specialties and accessories must be new materials in first-class condition. Used or recycled materials will not be allowed, regardless of condition.

B. Couplings

1. Sleeve Type, Flexible Couplings
  - a. Material - Steel, with epoxy coated sleeve.
  - b. Gasket - Manufacturer's standard best quality for the service intended.
  - c. Bolts and Nuts - Buried or submerged couplings shall be provided with Type 304 stainless steel or fluorocarbon coated bolts and nuts.
  - d. Couplings shall be designed for a working pressure and field hydrostatic test pressure as identified in Section 02698.
  - e. Harnessing
    - 1) Harness couplings to restrain pressure piping. Couplings shall be designed for a working pressure and field hydrostatic test pressure as identified in Section 02698.
    - 2) Adjacent flanges shall be tied with bolts of corrosion resistant alloy steel. Provide flange-mounted stretcher bolt plates and lugs as required and to be designed by coupling manufacturer, unless otherwise approved.
    - 3) Conform to dimensions, size, spacing and materials for lugs, bolts, washers and nuts as recommended by manufacturer and approved by ENGINEER for the pipe size, wall thickness and test pressure required. However, the following minimum bolting shall be provided if not specifically stated by the ENGINEER.

PIPE DIAMETER (INCHES)	MINIMUM NUMBER OF BOLTS	BOLT DIAMETER (INCHES)	AT (DEGREES)
4	2	5/8	180
6-8	2	3/4	180
10-12	2	7/8	180
14-20	4	1	90

- f. Remove pipe stop unless otherwise shown or specified.
- g. Couplings 16 to 24 inches shall be furnished as long laying lengths of 16 inches. Couplings over 24 inches shall be furnished as 10-inch lengths.
- h. Manufacturer
  - 1) Dresser Industries, Style 138, for sizes up to 12-inches; Dresser Industries, Style 38, for sizes over 12-inches,
  - 2) Smith-Blair, Type 411 (or Type 441 where specified)
  - 3) Or approved equal.
2. Hymax Coupling
  - a. Material - Center sleeve shall be fabricated of high strength carbon steel tubing. Compression end rings to be either one bolt or two fabricated of carbon steel.
  - b. Gasket - Two layered gaskets of which the inner ring is removable to expand the range of the coupling. Material shall be EPDM according to NSF61.
  - c. Bolts and Nuts - Buried or submerged couplings shall be provided with Type 304 stainless steel. Bolts to be coated with an anti-seize coating to prevent galling.
  - d. Coating - Interior and exterior shall be provided with NFS-61 approved fusion bonded epoxy coating.
  - e. Harnessing: as specified herein.
  - f. To be used only when approved by ENGINEER.
  - g. Manufacturer
    - 1) Dresser Industries Style 262 for sizes up to 12 inches.
    - 2) Or approved equal.

C. Flanged Coupling Adapter

1. The body shall be ductile iron conforming to ASTM A536. The bolt circle, bolt size, and spacing shall conform to AWWA C115 flange drilling.
2. The follower gland shall be ASTM A536 ductile iron.
3. Gaskets and O-rings shall be grade 30 standard.
4. Nuts and bolts shall be fluorocarbon coated or Type 304 stainless steel, high strength, low alloy.
5. Provide fusion bonded epoxy coating on the gasket ring and shop prime enamel on the body.
6. Flange coupling adapter shall not be provided with anchor studs, which are not allowed.
7. Flange coupling adapter shall be suitable for use on ductile or cast iron pipe to the outside diameter specified.
8. Flange coupling adapters shall be restrained as shown, specified, or required.
9. Manufacturer
  - a. Smith-Blair, Style 912.
  - b. Dresser, Style 128.
  - c. Ford FFCA.
  - d. Hymax 2100.
  - e. Or approved equal.

D. 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.

E. Repair Clamps

1. Repair clamps shall be full circle, 18-8 type 304 stainless steel single band provided in minimum length of 12-inches unless otherwise specified. Bands are to be single section for sizes to 12 inches and double sections for sizes over 12 inches.
2. Nuts and bolts shall be Type 304 stainless steel or fluorocarbon coated.
3. Ductile iron lugs shall be field removable.
4. Repair clamps with a separate keeper bar will not be accepted nor repair clamps with two bolts on a 7.5-inch full circle clamp.
5. Grade 60 gasket.
6. When ordered, provide tapped repair clamps with stainless steel outlet taps for corporation stops in CC (AWWA) thread.
7. Manufacturer
  - a. Smith-Blair Style 226 for sizes to 12 inches; Smith-Blair Style 227 for sizes over 12 inches; Smith-Blair 238 and 239 for tapped clamps.
  - b. Dresser, Style 360.
  - c. Ford, Style F1, for sizes to 12 inches; Ford, Style F2, for sizes over 12 inches.
  - d. Or approved equal.

F. Joint Clamps

1. Joint clamps shall be furnished to permanently stop or prevent leaks through the jointing materials of bell and spigot joints.

2. Clamp shall be fully adjustable to provide a close fit on the bell and spigot and shall be designed to be installed on pipes without interruption of water service.
  3. Manufacturers standard rubber gasket shall shut the leak off when compressed by the spigot ring drawn up, in turn, by bolts connected to a bell ring.
  4. Manufacturer
    - a. Smith-Blair, Style #274.
    - b. Dresser, Style 160.
    - c. Or approved equal.
- G. Service Saddles
1. Service saddles for iron, asbestos-cement pipe or PVC pipe shall be of the double strap style.
  2. Bodies shall be brass alloy conforming to ASTM B62 (85-5-5-5) and a threaded outlet conforming to AWWA C800.
  3. Straps shall be high quality silicon bronze, flattened to provide a wider bearing surface to the pipe.
  4. Nuts shall be brass alloy as per ASTM B62.
  5. Gasket shall be Buna-N rubber in accordance with ASTM D2000.
  6. Manufacturer
    - a. Smith-Blair, Style 323.
    - b. Ford, Style 202B.
    - c. Or approved equal.
- H. Service Fittings - Bronze Unions, Couplings and Adapters
1. General
    - a. Service fittings shall have a body cast from corrosion resistant bronze in accordance with ASTM B62 (85-5-5-5).
    - b. Connections shall meet applicable sections of AWWA C-800 and be suitable for flared connection to type K copper pipe.
  2. Manufacturer
    - a. Unions, copper to copper, three parts:
      - 1) Mueller Co #H-15400.
      - 2) Ford C22-XX.
      - 3) Or approved equal.
    - b. Unions, copper to copper, two parts:
      - 1) Mueller Co #H-15405.
      - 2) Ford C02-XX.
      - 3) Or approved equal.
    - c. Eighth bend coupling with gasket:
      - 1) Mueller Co #H-15063.
      - 2) Ford LA02-XX.
      - 3) Or approved equal.
    - d. Quarter bend coupling with gasket:
      - 1) Mueller Co #H-15068.
      - 2) Ford L02-XX.
      - 3) Or approved equal.
    - e. Straight male adapter:
      - 1) Mueller Co #H-15425.
      - 2) Ford C28-XX.
      - 3) Or approved equal.
    - f. Straight female adapter:
      - 1) Mueller Co #H-15450.
      - 2) Ford C21-XX.
      - 3) Or approved equal.

- I. "Y" Strainers
  - 1. Service – Dechlorination chemical feed system
  - 2. Type - Y-Pattern.
  - 3. Pressure Class/Rating - 250 psig.
  - 4. End Connections - True union.
  - 5. Material
    - a. Strainers on PVC piping shall be manufactured of PVC.
    - b. PVC shall be Type 1, Grade 1 in accordance with ASTM D 1784, and shall be dark gray in color.
    - c. Screens shall be manufactured of PVC with 1/32 perforations with Viton seals.
  - 6. Manufacturer
    - a. Hayward Industrial Products, Inc.
    - b. Or approved equal.
- J. Valve Boxes
  - 1. Valves installed in the ground shall be equipped with an adjustable screw type valve box, minimum 1 foot adjustment.
  - 2. The valve box shall have a barrel with a base to fit the valve on which it is to be installed.
  - 3. Valve boxes for gate valves shall be three piece screw type, 5-1/4-inch shaft with No. 6 base and a valve box cover.
  - 4. Valve boxes for butterfly valves shall be as noted above but without the base.
  - 5. Valve boxes shall be high quality cast-iron castings suitable for HS-20 loadings.
  - 6. All valve box parts must be compatible and interchangeable with Buffalo Pipe and Foundry Corp. valve boxes.
  - 7. Valve box covers shall be marked "water" and shall fit properly in the barrel without movement.
  - 8. Manufacturer
    - a. Bibby-LaPerle (Figure V619 #CC).
    - b. Hays.
    - c. Tyler - A division of McWane, Inc.
    - d. Sigma.
- K. Insulation
  - 1. Materials - Water main, valves, water service piping and fittings and other appurtenances installed where depth of bury is less than 54 inches (4 feet 6 inches) or where shown on the drawings, shall be fully wrapped with a closed cell polystyrene insulation.

## 2.02 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

3.01 GENERAL

- A. Install piping specialties and accessories as shown on the Contract Drawings and in accordance with the applicable requirements of Sections 15060.

END OF SECTION

## SECTION 15140

### TESTING, CLEANING, AND DISINFECTION OF HYDRAULIC STRUCTURES AND PIPING

#### PART 1 GENERAL

##### 1.01 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. 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.

##### 1.02 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.

#### 1.03 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

#### 2.01 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

#### 3.01 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.
- 3.02 LEAKAGE TEST
- A. Each valve and all flanged and/or restrained joints shall be deemed leak-free by the ENGINEER prior to acceptance.
- 3.03 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.
- 3.04 FINAL FLUSHING
- A. After disinfection, the line shall be flushed with clean water as defined in Initial Flushing section.
- 3.05 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 15150  
SUPPORTS AND ANCHORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping and equipment hangers and supports.
- B. Equipment bases and supports.
- C. Inserts.
- D. Schedules.

1.02 RELATED SECTIONS

- A. Section 05500 - MISCELLANEOUS FABRICATIONS.
- B. Section 09900 - PAINTING.
- C. Section 15100 - VALVES AND APPURTENANCES.

1.03 REFERENCES

ASME B31.1	Code for Pressure Piping (Power Piping)
ASME B31.2	Fuel Gas Piping
ASME B31.5	Refrigeration Piping
ASME B31.9	Building Services Piping
ASTM F708	Design and Installation of Rigid Pipe Hangers
MSS SP58	Pipe Hangers and Supports - Materials, Design and Manufacturer
MSS SP69	Pipe Hangers and Supports - Selection and Application
MSS SP89	Pipe Hangers and Supports - Fabrication and Installation Practices
NFPA 13	Installation of Sprinkler Systems
NFPA 14	Installation of Standpipe and Hose Systems
UL 203	Pipe Hanger Equipment for Fire Protection Service
Seismic Considerations	***Refer to State Building Codes***

1.04 SUBMITTALS

- A. Product Data - Provide manufacturers catalog data including materials and load capacity.
- B. Design Data - Indicate load carrying capacity of trapeze, unistrut, multiple pipe, and riser support hangers.
- C. Manufacturer's Installation Instructions - Indicate special procedures and assembly of components.

## 1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable code for support of piping.

## PART 2 PRODUCTS

### 2.01 GENERAL

- A. All hangers and supports shall be manufactured or fabricated from materials suitable for the particular area in which they are installed.
  - 1. The CONTRACTOR shall install hanger supports that are similar in material construction regardless of piping or conduit application within a given area.
  - 2. Pipe hangers and supports for process pipe, conduit, heating and ventilating piping and plumbing piping shall be constructed of similar materials, (e.g., all hangers and supports located in an interior wet location shall be manufactured from Type 316 stainless steel or PVC-coated galvanized steel).
  - 3. Where applicable, fasteners, brackets and supports shall be fabricated in accordance with Section 05500 and as specified herein.

### 2.02 MATERIALS

- A. Stainless Steel - For the purpose of this section, all stainless steel shall be Type 316.
- B. Polyvinyl Chloride (PVC) Coated Materials - PVC coated hangers and supports shall be installed where applicable for chemical and corrosion resistant applications as required in the specified areas, or as specifically called out in other sections of these specifications. PVC coating process shall be as follows:
  - 1. Hanger or support shall be hot dipped galvanized including the threads.
  - 2. The zinc surface shall be treated with chromic acid prior to coating to enhance the bond between metal and plastic.
  - 3. All surfaces shall be coated with an epoxy acrylic primer of approximately 0.0005-inch thickness.
  - 4. The coating shall be applied by the liquid plastisol method.
  - 5. The plastisol shall be compounded of pure materials and shall be free of any fillers or secondary plasticizers.
  - 6. A PVC coating shall be bonded to the galvanized outer surface of the product. The bond between the PVC coating and the product surface shall be greater than the tensile strength of the plastic. The thickness of the PVC coating shall be a minimum of 0.040-inch (40 mil).
  - 7. Coating system shall be OCAL-40 as provided by Occidental Coating Company, Van Nuys, CA; Plasti-Bond Red as provided by Robroy Industries, Verona, PA; or equal.
- C. Steel, Steel Alloys - Steel or steel alloy hangers and supports shall conform to ANSI B31.10 and MSS Standard Practice SP-58.

### 2.03 MANUFACTURERS

- A. Hangers and supports shall be as manufactured by Anvil International, Providence, RI; Basic Engineering (B.E.), Pittsburgh, PA; Carpenter & Patterson, Lakeport, NH; Unistrut Corporation; B-Line Systems; Globe Division of United States Gypsum; Robroy Industries; OCAL; or equal.

### 2.04 CORROSION RESISTANCE

- A. All pipe supports in wet, corrosive, hazardous or exterior locations shall have stainless steel support rods, stainless steel mounting hardware, stainless steel fasteners, and stainless steel concrete inserts. All non-stainless steel parts of the hangers and supports shall be PVC coated.

- B. All other areas shall have cadmium-plated appurtenances unless specified otherwise.

## 2.05 HANGER AND SUPPORT SCHEDULE

- A. The following schedules are provided to identify the type of hangers and supports acceptable under this Contract. The CONTRACTOR shall provide the type of hangers and supports in these schedules; however, the acceptable materials of construction shall be provided as identified in the Application Schedule for the various systems and the intended location of the hanger or support.

### PIPE HANGER AND SUPPORT SCHEDULE INSIDE PROCESS PIPING

TYPE	PIPE SYSTEM	DESIGNATION	ANVIL	B.E.
A	Steel	Clevis hanger	260	BE120
A	Steel, insulated	Clevis hanger	300	BE119
A	Ductile iron	Clevis hanger	590	BE174
A	PVC	Clevis hanger	65	--
B	Ductile iron, steel	Pipe stanchion saddle, pipe support and floor plate with S.S. yoke.	259	BE141
C	Ductile iron, PVC	Split pipe clamp with base flange	138R	--
D	PVC and steel	PVC coated clamp.	262	--
E	Ductile iron, steel	Pipe support in trench	--	--
F	Ductile iron	Concrete base fitting support	--	--
G	Ductile iron, steel	Concrete pipe support	--	--
H	Ductile iron, steel	Welded steel bracket	199	BE203
I	PVC, hose	Pipe channel support	--	--
J	Ductile iron, steel PVC	Channel framing	--	--
K	Ductile iron, steel	Steel pipe floor support	--	--
L	Ductile iron, steel, PVC	Concrete pipe support in trench	--	--
M	Ductile iron, steel, PVC	Steel angle pipe support	--	--
X	Ductile iron, steel	Steel pipe floor support with top plate and U-bolt	--	--

1. Type J and E pipe supports shall be an applicable channel system, for the pipe loading and Unistrut span utilized by Unistrut Corporation, B-Line Systems, Globe Division of United States Gypsum; or equal.
  - a. System shall permit rigid metal construction without welding or drilling.
  - b. All members shall be fully adjustable, demountable and reusable.
  - c. One manufacturer shall furnish system complete with all nuts, bolts, couplers, channels and all other required fittings and mechanical accessories.
  - d. Channels and accessories shall be galvanized steel with 20 mil PVC coating, all of the same color.
  - e. All mounting hardware, fasteners and concrete inserts shall be Type 316 stainless steel.
  - f. Pipe clamps shall be PVC-coated galvanized straps with stainless steel rods, nuts, and flat washers.
  - g. Verify that the load carrying capacity of the Unistrut system is adequate for weight of pipes and contents and span utilized.

## HEATING AND VENTILATING PIPING

TYPE OF PIPE	INSULATED	ANVIL HANGER FIGURE NO.
<b>Hung Piping - Stationary:</b>		
Steel	No	260
Steel	Yes	300
<b>Hung Piping - Subject to Movement:</b>		
Steel	No	174
Steel	Yes	174 with saddle
<b>Wall Supported Piping – Stationary:</b>		
Steel	No	260 with 213, 194, 195 or 199 wall bracket
Steel	Yes	300 mounted on 213, 194, 195, or 199 wall bracket
<b>Wall Supported Piping - Subject to Movement:</b>		
Steel	No	175 with 213, 194, 195, or 199 wall bracket
Steel	Yes	175 with 160 saddle mounted on 213, 194, 195, or 199 wall bracket
<b>Vertical Piping Supports:</b>		
Steel	Yes/No	261 riser clamp
<b>Floor Supported Piping:</b>		
	Yes	258 or 264 pipe saddle support

## PLUMBING PIPING

TYPE OF PIPE	INSULATED	ANVIL HANGER FIGURE NO.
<b>Hung Piping - Stationary:</b>		
Steel, wrought or cast iron	No	97
Copper	No	CT-99C-plastic coated
Steel or wrought iron	Yes	97 with 167 shield
Copper	Yes	97 with 167 shield
<b>Hung Piping - Subject to Movement:</b>		
Steel, wrought or cast iron	No	174
Steel, wrought or cast iron	Yes	174 with saddle
Copper	Yes	174 with saddle
<b>Wall Supported Piping – Stationary:</b>		
Steel, wrought or cast iron	No	260 with 213, 194, 195, or 199 wall bracket
Copper	No	CT-99C and rod with 194 wall bracket
Steel or wrought iron	Yes	260 with saddle mounted on 194, 195 or 199 wall bracket
Copper	Yes	C-97 with rod and 167 shield

## PART 3 EXECUTION

### 3.01 GENERAL

- A. All piping to be supported from floors, concrete slabs, ceilings or walls shall have supports and parts required for the installation of the piping systems which conform to the requirements of Chapter 1, Section 6 of the ANSI Code for Pressure Piping (B31.1), except as modified and supplemented by the requirements set forth in these specifications.

### 3.02 HANGER AND SUPPORT APPLICATION SCHEDULE

- A. The materials of construction for all hangers and supports, applicable to inside process piping, fire protection, plumbing and HVAC systems, used on the project, shall be in accordance with the Hanger and Support Application Schedule at the end of this section.

### 3.03 SUPPORT INTERVALS

- A. At a minimum, additional supports or anchors will be required at:
  - 1. All bends on pump discharge line to prevent vertical or horizontal movement resulting from pressure thrusts.
  - 2. Each side of all couplings in the horizontal plane to eliminate vertical force on couplings.
  - 3. All branch connections to eliminate vertical and horizontal movement.
  - 4. Both side of expansion joints to prevent horizontal movement.
  - 5. All pipe joints subject to torque along centerline of pipe. Piping shall be supported so that pumps and other equipment may be removed without providing additional pipe support.
  - 6. Where depicted on the Contract Drawings, pipe supports shall be of the type indicated.
- B. Flanged Ductile Iron Pipe - Supports and hangers for flanged ductile iron and steel pipe 1-1/4 inches and larger shall not be more than 10 feet on center.
  - 1. Additional supports and hangers will be required for grooved end ductile iron pipe and fittings at the CONTRACTOR's expense.
- C. Plastic Pipe - Supports and hangers and/or braces for plastic piping shall be used at all bends and at not more than 4 feet on center horizontally and vertically, except non-metallic electrical conduit spacing shall be 3 feet on centers.
  - 1. Supports and hangers for plastic piping shall include saddles and bands to distribute load and thus avoid localized deformation of the pipe.
  - 2. All necessary inserts or appurtenances shall be furnished and installed in the concrete or structures for adequately securing these supports to the structure.
- D. Steel and Wrought Iron Pipe - Hangers and supports for steel and wrought iron pipe less than 1-1/4 inches shall not exceed 8 feet 0 inches; 1-1/4 inches and larger, 10 feet 0 inches maximum.
- E. Cast Iron Pipe - Cast iron soil pipe shall be supported at each length, close to bell.

### 3.04 EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 4 inches thick and extending 6 inches beyond supported equipment. Refer to Division 3 specifications.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports of steel members. Steel pipe and fittings. Brace and fasten with flanges bolted to structure.
- D. Provide rigid anchors for pipes after vibration isolation components are installed.



3.05      INSERTS

- A.    Provide inserts for suspending hangers from concrete slabs and sides of concrete beams.

3.06      HANGER AND SUPPORT APPLICATION SCHEDULE

AREA	ACCEPTABLE MATERIALS
<b>EXTERIOR:</b>	
Exposed to outdoor conditions	Stainless steel
<b>INTERIOR:</b>	
Building E	Stainless steel
Building B	Stainless steel

END OF SECTION

## SECTION 15170

### MOTORS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. All electric motors supplied under these Contract Documents shall conform to this specification as minimum requirements.
- B. All electric motors shall conform to ANSI Standards for Rotating Electrical Machinery (Designation C50) and to NEMA Standards MG-1 for Motors and Generators (NEMA Standard Publication latest revision) and to NEC, Article 430.
- C. The rating of the motors offered shall in no case be less than the horsepower required in the Contract Documents.
- D. Motors shall operate without an undue noise or vibration and shall show no signs of electrical unbalance.
- E. Motor efficiency shall be a prime consideration in selection of all motors. Unless otherwise specified in the individual equipment specifications, motors shall meet the requirements of Article 1.8.

##### 1.02 RELATED SECTIONS

- A. General Provisions.
- B. General Specifications.
- C. All other sections where motors are specified or required.

##### 1.03 SUBMITTALS

- A. Shop Drawings of Electric Motors - Submit in accordance with the General Provisions and the General Specifications.
- B. Include with submittals:
  - 1. Electric characteristics.
  - 2. Design characteristics.
  - 3. Mechanical construction.
  - 4. Manufacturer's name.
  - 5. Manufacturer's type.
  - 6. Pertinent specifications for the use intended.
  - 7. Name of the equipment to be driven.

- C. Tabulate the following information in one location on each electric motor shop drawing submittal:

Motor manufacturer	Nameplate horsepower
Model	Motor rpm, full load nameplate
Frame number	Insulation class
Type of enclosure	Service factor
Volts	Maximum ambient temperature
Hertz	Maximum temperature rise
Phase	Shop painting
NEMA design	Nominal efficiency
Code letter	Guaranteed minimum efficiency at 50, 75 and 100% full load
Locked rotor amps	Minimum power factor at 50, 75 and 100% load
Locked rotor torque	Resistance temperature device information (if applicable)

#### 1.04 INSULATION

- A. Minimum NEMA Class B insulation unless otherwise noted in the individual equipment specifications.
- B. Provide Class F insulation if required by the manufacturer to meet specified energy efficiency.
- C. Use Class F or H insulation where ambient temperatures exceed 104 degrees F (40 degrees C) as shown on the Contract Drawings or elsewhere in the Specifications.
- D. Where motors are to be used with variable frequency drives (VFDs), Insulation systems shall be “inverter grade” with Class F thermostats. Insulation system shall meet NEMA MG 1-31 standards.

#### 1.05 RATINGS AND DESIGN

- A. Furnish with adequate ratings to accelerate and drive connected equipment under all normal operating conditions without exceeding nameplate ratings.
- B. Furnish with service factors in accordance with NEMA standards as follows unless otherwise noted in individual equipment specifications.

Type of Machine	Minimum Service Factor (sf)
Mill and chemical duty	1.15
Open drip-proof	1.15
All others	1.0
Submersible	1.15
Inverter duty	1.0

- C. Motors shall operate successfully under running conditions at rated load and frequency with a voltage variation up to 10 percent; at rated load and voltage with a frequency variation up to 5 percent; and at rated load with a combined variation in voltage and frequency not more than 10 percent above or below the rated voltage and frequency provided that the frequency variation does not exceed 5 percent.
- D. Assume voltage unbalance to be 1 percent. Altitude is less than 3,300 feet.
- E. Assume ambient temperatures to be 40 degrees C for motors in air and 25 degrees C for submersible motors.

- F. Motor winding temperature rise shall be as follows:

	Class of Insulation		
	b	f	h
Open, drip-proof motors	80°C	105°C	125°C
Totally enclosed fan-cooled motors	80°C	105°C	125°C
Totally enclosed non-ventilated motors	85°C	110°C	135°C
Explosionproof motors	80°C	105°C	125°C
All other motors with 1.15 SF or higher	90°C	115°C	--

- G. Use the applicable paragraphs of NEMA MG1-12.42 in making design selections.
- H. Unless otherwise specified, all three-phase motors shall be constant speed, squirrel cage induction type.
1. The CONTRACTOR shall provide multi-speed (multiple windings or consequent poles - single winding, wound rotor, etc.) where required as specified in individual equipment specifications.
- I. Motor Voltages
1. Motors of 1/2 HP and Larger - Squirrel cage induction type designed for 3 phase, 60 cycle, 230/460 volt operation unless otherwise specified.
  2. Motors Smaller Than 1/2 HP - Capacitor type designed for single phase, 60 cycle, 120 volt operation unless otherwise specified.
  3. Motors indicated on the Contract Drawings and/or specified in the specifications as 208 volt shall be specially wound for voltage indicated and/or specified.
  4. Dual-rated motors (i.e., 208/230 volts) are not acceptable for operation on 208 volts.
- J. Motors intended for inverter duty (those controlled through variable speed drives), shall be specifically manufactured for inverter duty and shall be rated to meet or exceed the requirements of NEMA MG1 Part 31. Motors rated "suitable for use with VFDs" or similar wording are not acceptable.
- K. Unless otherwise specified, all single-phase motors shall be NEMA design letter M or N, designed to withstand full voltage starting in accordance with MG12.32.
1. Motors shall comply with NEMA Standards for Definite Purpose Motors (paragraphs 18.001-18.717).
- L. In general, capacitor start induction run or split phase-type motors shall be used unless otherwise approved by the Engineer.
- M. Shaded pole motors larger than 1/8 HP will not be allowed.
- N. Thermal overload protectors and any auxiliary components necessary to provide required starting characteristics including capacitors, resistors and automatic switching devices shall be furnished and mounted integrally unless motor starters with overload protection are provided.

#### 1.06 MECHANICAL CONSTRUCTION

- A. Unless otherwise specified, electric motors shall be of the following types of construction according to the degree of mechanical protection:

1. Totally Enclosed, Fan-Cooled (TEFC) Motors - When located outdoors or indoors in wet areas such as washdown areas or elsewhere if specified.
    - a. Winding heaters shall be provided when specified.
  2. Mill and Chemical Duty or Severe Duty - Suitable for use in corrosive areas unless otherwise specified in individual equipment specifications.
  3. Submersible Motors - For submerged application.
    - a. Provide motor winding thermal protection in motors 1 HP and larger.
  4. In all other cases, they shall be open drip-proof.
- B. Encapsulated Windings - Where specified, an additional “dip and bake” will not be acceptable. Encapsulation shall be Contour Mold Everseal by U.S. Motors; Costum Polyseal by General Electric; or equal.
- C. Bearings
1. Unless otherwise specified or required, motors rated above 2 HP shall have the bearings of the grease lubricated, anti-friction ball type with conveniently-located grease fittings.
  2. Provide a means of preventing bearings from becoming over greased (such as double shields on bearings or pressure sensitive relief fittings).
  3. Unless otherwise specified, bearings shall be rated at a minimum L-10 (B-10) life of 150,000 hours for direct coupled motors and 50,000 hours for belted motors under axial loads.
  4. Submersible motors shall have bearings rated of an L-10 or B-10 life of minimum of 17,500 hours.
  5. For motors used with VFDs, bearings shall be of the insulated type. Couplings to pump or drive shall also be of the insulated type.
- D. Vertical shaft construction, the motors shall have adequate thrust bearings to carry all motor loads and any other operating equipment loads.
1. Grease slingers to be provided.
- E. Horizontal Shaft Construction - Coupled to fluid pumps, the motors shall either have adequate thrust bearings or they shall have the couplings end play and rotor float coordinated to prevent damage to rotor bearings.
- F. Rotors
1. Statically and dynamically balanced.
  2. Have secondary bars of heavy copper silver-brazed to one-piece end rings or they shall have rotor windings of one-piece cast aluminum.
  3. Where applicable, construct with integral fans.
- G. Inverter duty motors shall have enhanced rotor and stator designs.
- H. Non-reversing ratchets shall be provided where specified in the individual equipment specifications.
- I. Nameplates - Stainless steel furnished with all motors, with markings in accordance with NEMA MG1, latest revision, MG1-10.38.

J. Terminal Boxes

1. Sized in accordance with NEC, Article 430-12 and of sufficient size to accommodate conduits and conductor sizes as shown on Contract Drawings.
2. Furnish rubber gasketed terminal boxes with splash-proof and totally enclosed motors.
3. Horizontal Motors - Locate on the left hand side, when viewing the motor from the drive shaft ends and design such that conduit entrance can be made from above, below or either side of the terminal box.
4. Include grounding lug in terminal box.
5. Oversize terminal boxes in the following applications:
  - a. Motors 7-1/2 HP and larger operating at 208 or 230 volts.
  - b. Motors 20 HP and larger operating at 460 volts.

K. Motors used with belt drives shall have grease slingers on the sheave end and sliding bases to provide for belt take-up.

L. Cast iron construction for all motors, when available for the application.

M. All motor installations shall include shims for future adjustment.

1.07 MOTOR POWER FACTORS

A. Provide when called for on the Contract Drawings.

B. Provide for all three-phase motors, 7-1/2 HP or larger, 1200, 1800, and 3600 rpm (nominal), 60 Hertz, constant single speed (not VFD controlled), squirrel cage induction-type, which do not have a minimum power factor of 85 percent. Motors which cannot meet this criteria shall have power factor correction capacitors, switched integrally with the motors (unless otherwise required by either the motor or starter manufacturer), which will bring the power factor up to a minimum of 90 percent.

C. Furnish and install, at no additional cost to the OWNER, the capacitors and provide all necessary wiring to connect them to the motor terminals or motor controller terminals.

1. Properly size fused switch or circuit breaker to serve as a disconnect for the capacitor.

D. Capacitor and Disconnect Enclosure:

Indoors mounting (non-hazardous)	NEMA 12 wall mounted
Indoor wet areas	NEMA 4 wall mounted
Outdoors mounting	NEMA 4 wall, pad, or mounting stand mounted
Explosion proof areas	NEMA 7 wall mounted (DS only)*
Corrosive areas	NEMA 4X wall mounted*

\*Locate capacitor outside the hazardous or corrosive area.

E. Size capacitors so they do not increase the self-excitation voltage above the motor nameplate rating.

F. Do not use capacitors on motors controlled by variable frequency drives.

- G. When used with solid-state starters, energize only after bypass or full speed bypass contactor is energized. Verify with starter manufacturer their connection requirements and follow them.

#### 1.08 MOTOR EFFICIENCY

- A. All single speed, three-phase, squirrel cage induction-type motors 1 HP or larger, 60 Hertz, shall have nominal efficiencies in accordance with attached Table 1, unless specifically otherwise specified in the respective equipment section.
  - 1. Determine efficiencies by using IEEE Test Procedure 112, Test Method B using segregated losses. Motors shall be listed by their manufacturers and be nameplated with the words "NEMA Premium®". Motors without this designation are not applicable for incentives.
  - 2. List guaranteed minimum efficiencies on motor nameplate. Adhere to the latest nominal efficiencies eligible for a rebate published by the local utility where rebates are available. Those efficiencies may be higher than those listed in Table 1 at the end of this section.
  - 3. Where rebates are available, submit to the OWNER paid invoices for each specific motor supplied for which a rebate is being sought. The invoice shall indicate motor type, size, make, model number of the motor, and the date of purchase.
  - 4. If a motor submitted does not meet the minimum efficiency, the CONTRACTOR will be required to credit the OWNER with the utilities rebate plus the cost of operating the motor for 20 years for the duty hours applicable for the motor, but no less than 2,190 hours per year, at the reduced efficiency with an estimated utility cost increase of 50 percent every 5 years.

#### 1.09 FIELD TESTING

- A. All three phase electric motors 1/2 HP and larger and all single phase electric motors 1 HP and larger shall be field tested by the CONTRACTOR at as near operating conditions as possible. Complete and submit all of the information required by the attached "Motor Test Record" for all motors to be tested per the above. Submit record prior to the issuance of the "Substantial Completion Certificate." See General Provisions and General Specifications. CONTRACTOR, for the purposes of this item, is the one furnishing and/or installing the final motor-driven unit.
- B. All testing shall be witnessed by the ENGINEER.
- C. Submit completed forms in quadruplicate (one set to be submitted at the time when substantial completion is requested, and one set to be placed in each of the submitted O&M manuals).

#### 1.10 MOTOR SHOP TESTS

- A. Perform motor shop tests in accordance with the IEEE Code for polyphase induction machines. Use NEMA report-of-test forms and submit results to the ENGINEER, in five copies, for his approval.
- B. Test each motor and submit report; for power factor and efficiency at 50, 75 and 100 percent of its rated horsepower; for insulation resistance and dielectric strength; for heating; and for compliance with all specific performance requirements.

- C. For motors less than 100 HP, provide guaranteed performance data based on previous testing of the motor design. For motors of 100 HP or larger, make complete tests of each motor and furnish certified test data sheets.

#### 1.11 PAINTING

- A. All motors shall have a manufacturer's standard shop rust-resisting priming coat. Finish coat, either shop or field applied, shall be in accordance with Section 09900.

TABLE 1  
NOMINAL EFFICIENCIES FOR "NEMA PREMIUM™" INDUCTION MOTORS  
RATED 600 VOLTS OR LESS (RANDOM WOUND)

	Open Drip-Proof*				Totally Enclosed Fan-Cooled*			
hp	900	1200	1800	3600	900	1200	1800	3600
1	74.0	82.5	85.5	77.0	74.0	82.5	85.5	77.0
1.5	75.5	86.5	86.5	84.0	77.0	87.5	86.5	84.0
2	85.5	87.5	86.5	85.5	82.5	88.5	86.5	85.5
3	86.5	88.5	89.5	85.5	84.0	89.5	89.5	86.5
5	87.5	89.5	89.5	86.5	85.5	89.5	89.5	88.5
7.5	88.5	90.2	91.0	88.5	85.5	91.0	91.7	89.5
10	89.5	91.7	91.7	89.5	88.5	91.0	91.7	90.2
15	89.5	91.7	93.0	90.2	88.5	91.7	92.4	91.0
20	90.2	92.4	93.0	91.0	89.5	91.7	93.0	91.0
25	90.2	93.0	93.6	91.7	89.5	93.0	93.6	91.7
30	91.0	93.6	94.1	91.7	91.0	93.0	93.6	91.7
40	91.0	94.1	94.1	92.4	91.0	94.1	94.1	92.4
50	91.7	94.1	94.5	93.0	91.7	94.1	94.5	93.0
60	92.4	94.5	95.0	93.6	91.7	94.5	95.0	93.6
75	93.6	94.5	95.0	93.6	93.0	94.5	95.4	93.6
100	93.6	95.0	95.4	93.6	93.0	95.0	95.4	94.1
125	93.6	95.0	95.4	94.1	93.6	95.0	95.4	95.0
150	93.6	95.4	95.8	94.1	93.6	95.8	95.8	95.0
200	93.6	95.4	95.8	95.0	94.1	95.8	96.2	95.4
250	94.5	95.4	95.8	95.0	94.5	95.8	96.2	95.8
300	--	95.4	95.8	95.4	--	95.8	96.2	95.8
350	--	95.4	95.8	95.4	--	95.8	96.2	95.8
400	--	95.8	95.8	95.8	--	95.8	96.2	95.8
450	--	96.2	96.2	95.8	--	95.8	92.2	95.8
500	--	96.2	96.2	95.8	--	95.8	96.2	95.8

The shaded areas indicate motor classes generally covered by the efficiency standards of utilities or state agencies.

\*Nominal speed; for two-speed motors, the efficiency applies to the highest speed.



For submersible motors, other motor horsepowers, speeds, and for Design C and D motors, the efficiencies shall be in accordance with the applicable equipment specification sections.

## MOTOR TEST REPORT

Equipment Description \_\_\_\_\_ Equipment No. \_\_\_\_\_  
Equipment Loc. \_\_\_\_\_  
Drawing Nos. and Rev. \_\_\_\_\_  
MCC/Panel No. \_\_\_\_\_ Section/CKT. No. \_\_\_\_\_  
Control CKT. No. \_\_\_\_\_

## NAMEPLATE DATA

Motor Mfr. \_\_\_\_\_ HP \_\_\_\_\_ Rpm \_\_\_\_\_ S.F. \_\_\_\_\_  
Volts \_\_\_\_\_ Phase \_\_\_\_\_ F.L. Amp \_\_\_\_\_ KVA Code \_\_\_\_\_ ☐ Rise \_\_\_\_\_  
Serial No. \_\_\_\_\_ Other \_\_\_\_\_  
Locked Rotor KVA \_\_\_\_\_ Efficiency \_\_\_\_\_

Prestart Checks      Date

Lubrication Checked (Motor and Driven Equipment) \_\_\_\_\_  
Motor Rotates Freely \_\_\_\_\_  
Overload Heater Size/Setting \_\_\_\_\_ (located at starter) \_\_\_\_\_  
Control Circuit Tested \_\_\_\_\_  
Breaker Size (Frame Size/Trip Element Rating) \_\_\_\_\_  
Motor Insulation Resistance (Megger)  
Test Volts \_\_\_\_\_ (500V for up to 250V motors and 1000V for up to 600V motors)  
Test Duration - 1 minute

Phase A to Gnd \_\_\_\_\_ Phase B to Gnd \_\_\_\_\_ Phase C to Gnd \_\_\_\_\_  
Phase A to B \_\_\_\_\_ Phase B to C \_\_\_\_\_ Phase C to A \_\_\_\_\_

## UNCOUPLED DATA

(Provide this only when motor is shipped, uncoupled.  
Do not uncouple motor from drive to test.)

Bus Voltage \_\_\_\_\_ Inrush Current \_\_\_\_\_ Amps \_\_\_\_\_ Sec Run in Time \_\_\_\_\_  
Average Running Current \_\_\_\_\_ A \_\_\_\_\_ B \_\_\_\_\_ C Rotation \* \_\_\_\_\_  
Rpm \_\_\_\_\_  
Performed by \_\_\_\_\_ Date \_\_\_\_\_  
Approved by \_\_\_\_\_ Date \_\_\_\_\_  
Test Engineer \_\_\_\_\_

COUPLED DATA

Bus Voltage\_\_\_\_\_ Inrush Current\_\_\_\_\_ Amps \_\_\_\_\_ Sec Run in Time \_\_\_\_\_  
Average Running Current\_\_\_\_\_ A \_\_\_\_\_ B \_\_\_\_\_ C Rotation \* \_\_\_\_\_  
Rpm\_\_\_\_\_ System Lineup/Conditions \_\_\_\_\_

Test Equipment Control Nos. \_\_\_\_\_

Remarks: \_\_\_\_\_

Performed by \_\_\_\_\_ Date \_\_\_\_\_  
Approved by \_\_\_\_\_ Date \_\_\_\_\_  
Test Engineer \_\_\_\_\_

\*As viewed from motor outboard end. EQUIPMENT NO. \_\_\_\_\_

END OF SECTION

## SECTION 16055

### ELECTRICAL WORK

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. General work description and requirements for electrical work included in this contract.
- B. Raceways, fittings and boxes.
- C. Conductors and accessories.
- D. Wiring devices.
- E. Grounding.
- F. Panelboards.
- G. Disconnect and safety switches.
- H. Electrical supports, anchors, and fasteners.
- I. Nameplates and labels.
- J. Equipment testing.
- K. Spare devices.

##### 1.02 RELATED SECTIONS

- A. All sections of Division 1 - General Requirements.
- B. Section 02030 - DEMOLITION.
- C. Section 09900 - PAINTING.
- D. Section 16161 - CONTROL PANELS AND ENCLOSURES.
- E. Section 16475 - OVERCURRENT PROTECTIVE DEVICES.
- F. Section 16950 - ELECTRICAL TESTING AND INSPECTION.
- H. All Division 17 sections.

##### 1.03 GENERAL REQUIREMENTS

- A. All work shall be subject to applicable sections of these specifications, not necessarily the aforementioned related sections.
- B. Examination of Premises:
  - 1. Before submitting a proposal, the CONTRACTOR shall examine all drawings and specifications relating to work of all trades to determine scope and relation to other work.
  - 2. Ascertain access to site, available storage, and delivery facilities.

3. Before commencing work, verify all governing dimensions and examine all adjacent work at site and/or buildings.
4. Some equipment or material items may be special order items having long order times and shall be ordered well in advance of installation. Unavailability due to long lead times or special orders is not an excuse for not providing the specified items.

#### 1.04 SCOPE OF WORK

- A. The principal items of electrical work include, but are not necessarily limited to, the following:
  1. Provide all electrical power, control, instrumentation, and ductbanks, including raceway systems, conductors, cables, fittings, special control, wiring devices, distribution equipment, starters, variable frequency drives (VFDs) except when specifically provided under other sections, overcurrent protection, terminations, connections, and interconnections, and all related appurtenances to provide a complete and operating electrical/instrumentation system.
  2. Provide all system and equipment grounding in conformance with the requirements of these specifications and the NEC.
  3. Provide electrical labels, signs, and nameplates per this section.
  4. Install all electrical equipment, conduit, wire, conductors, cable, connections, etc., required for complete and operating systems.
  5. Coordinate work with the work of others for timely completion of the electrical/instrumentation work.
  6. Repair, fill, and/or patch surfaces of all building components including walls, floors, ceilings, and roofs damaged or left open or bare as a result of the electrical work.
  7. Have an OWNER-approved third-party inspecting agency inspect electrical installation. Submit a final certificate approving all work to the ENGINEER prior to final acceptance of the electrical work.
  8. See Section 01780 for additional requirements for record drawings, operation and maintenance manual, final testing and inspection, and guarantees and warranties.
  9. Provide all materials, equipment, and labor required for complete and operating electrical power and instrumentation wiring systems.
  10. Perform all trenching, backfilling, compaction, restoration of surfaces, dewatering (as required), ductbank fabrication, and work required for grounding system, electric services distribution, and instrumentation.

#### 1.05 CODES AND STANDARDS

- A. Reference to various codes and standards are a minimum installation requirements standard. In case(s) of discrepancy between the Contract Documents and the NEC, the stricter requirement shall apply.
- B. All work, equipment, and materials furnished shall conform with the existing rules, requirements, and specifications of the Insurance Rating Organization having jurisdiction; the National Electrical Code (NEC); the National Electric Manufacturer's Association (NEMA); the Underwriters Laboratories (U.L.); and the respective utilities.
- C. All material and equipment shall bear the inspection labels of Underwriters Laboratories, unless otherwise allowed by the ENGINEER in writing and if the material and equipment is of the class inspected by said laboratories. All labeling shall be for the intended usage.

- D. The CONTRACTOR shall be held responsible for adherence to all rules, requirements, and specifications as set forth above. Any additional work or material necessary for adherence will not be allowed as an extra but shall be included in the bid price. Ignorance of any rule, requirement, or specification shall not be allowed as an excuse for non-conformity. Acceptance by the OWNER or ENGINEER does not relieve the CONTRACTOR from the expense involved for the correction of any errors, which may exist in the drawings submitted or in the satisfactory operation of any equipment.

#### 1.06 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01331.
- B. The ENGINEER's approval shall be obtained for all equipment and material for which shop drawings are required before delivery to the job site. Delivery, storage or installation of equipment or material, which has not had prior approval, will not be permitted at the job site.
- C. Provide submittals for all conduit, wire, cable, boxes other than device boxes, enclosures, fittings, hangers, low voltage splices, disconnect switches, motor control centers, starters, overloads, overcurrent devices, panelboards, control and starter panels, and all other electrical equipment as listed in other Sections.

#### 1.07 RECORD DRAWINGS

- A. In addition to the requirements of Section 01780 regarding record drawings, prepare and submit marked-up field record drawings, which shall include all addenda items and changes made during construction, to the ENGINEER prior to final acceptance. Additionally, submit record drawings consisting of the following three types of drawings:
  - 1. Elementary or Schematic Diagrams - All control schematics and elementary diagrams. Those constructed as shown on Contract Drawings need only be verified on the marked-up field set. For those that changed, submit preliminary revised schematic and elementary diagrams for the ENGINEER's review. Once reviewed and approved, these diagrams shall be drafted on 24-inch by 30-inch sheets and added as "A" sheets.
  - 2. Block Diagrams - Prepare and submit fully labeled block diagrams, showing all point-to-point connections giving conduit size and fill (each conductor number, size, and color listed) showing all junctions boxes, pullboxes, panels, etc., together with terminal numbers at all conductor terminations. Initially, hand sketches on 8-1/2-inch by 11-inch sheets can be submitted for review. Once reviewed and approved, these designs shall be drafted on 24-inch by 36-inch sheets with suitable title block data. Block diagrams are to be updated to reflect all final connections (connections labeled) or other changes. When there is more than one sheet of block diagrams, an index shall be included to indicate on which sheet the respective pieces of equipment can be found. See sample attached to end of this Section.
  - 3. CONTRACTOR's As-built Drawings - Provide one 24-inch by 36-inch copies of electrical as-built drawings of the Contract Drawings with all field notes and comments to illustrate actual construction conditions. As-built drawings shall include all addenda items issued during bidding and all other changes to the documents that occurred during construction. Drawing to be titled "CONTRACTOR's As-built Drawing, Prepared by: (name of Contactor), Date Issued:         ." Electronic copies of the as-bid set of Contract Drawings will be provided to the CONTRACTOR for use in record drawing preparation. CONTRACTOR shall modify the as-bid set of drawings for record drawings. All drawings shall be prepared using AutoCAD drafting; no paste-on information will be allowed.
- B. "A" drawings shall be prepared (24-inch by 36-inch) showing all concealed conduit including ductbanks that cannot be shown clearly on the marked-up field set. All underground conduit routings and ductbanks shall be dimensioned from aboveground structures. All manholes, handholes, pullboxes, and bends without structures shall have at least two ties.

- C. Once final approval of the drawings with corrections is provided to the CONTRACTOR, all final drawings shall be provided on a compact disc and produced using the computer-aided drafting system, AutoCAD 2007, as a minimum. Later revisions shall be saved as this version.

#### 1.08 EQUIPMENT PROTECTION

- A. Equipment and material shall be delivered to the site in new, unused condition in original packaging. CONTRACTOR shall be responsible to store equipment and protect against damage, theft, dirt, moisture and temperature extremes.
- B. During the installation of equipment, controls, controllers, circuit protective devices, etc., these items shall be protected against entry of foreign matter and be vacuum cleaned both inside and outside before testing and operation.
- C. Damaged equipment, as determined by the OWNER and/or the ENGINEER, shall either be repaired to new condition or replaced with new equipment.
- D. Painted surfaces shall be protected with factory installed removable heavy craft paper, sheet vinyl or similar protective cover.

#### 1.09 EQUIPMENT INSTALLATION AND REQUIREMENTS

- A. The locations of equipment, fixtures, outlets and similar devices shown on the Contract Drawings are approximate only.

Equipment shall be installed as close as practical to locations shown on the Drawings. Where CONTRACTOR-supplied equipment sizes differ from that anticipated on the Drawings, the CONTRACTOR shall prepare and submit to the ENGINEER new "to scale" layouts showing new equipment locations for approval.

- B. Equipment Provided Under Other Divisions
  - 1. Reasonable effort has been made to show the actual locations and sizes of the equipment to be provided under other sections of the specifications and installed by other trades for the project. These locations shall be considered approximate, but suitable for preparation of the CONTRACTOR's bid. These locations are not necessarily final locations. CONTRACTOR shall verify equipment size and location before rough in and obtain the applicable shop drawing information to enable the electrical trade(s) to furnish and install electrical service to the equipment.
  - 2. The CONTRACTOR shall coordinate the exact locations of all equipment, receptacles, box-outs, sleeves and similar items required for the completion of electrical work with the structural, architectural, mechanical or other work.
  - 3. The wiring configuration of equipment provided by other divisions will vary, depending on the manufacturer used. Specific wire connections to equipment provided by other divisions are not shown in these documents. The electrical installer(s) shall coordinate the wire connections with the division supplying the equipment.
  - 4. No additional compensation will be made for relocations, reconnections or additional work required as a result of the failure of the CONTRACTOR to fully coordinate the work of all trades.
- C. Inaccessible Equipment
  - 1. Where the ENGINEER determines that the CONTRACTOR or his subcontractors has installed equipment that is not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled as required by the ENGINEER at the CONTRACTOR's expense.

2. "Conveniently accessible" is defined as reachable without the use of ladders, without climbing over or crawling under obstacles such as equipment, structures, piping and ductwork. Equipment shall be installed at the heights as specified in other Sections of these Specifications, except any readout devices shall be installed so that the centerline of the readout is 5 feet 0 inches above finish floor.
- D. Equipment and Material - Equipment and material shall be designed to assure satisfactory operation and operating life for environmental conditions where being installed. These specifications, the NEC and other code requirements shall apply to the installation in areas requiring special protection; i.e., hazardous, wet or corrosive area/location, and weatherproof construction.
- E. Classified Areas
1. General - Enclosures for classified areas shall be as specified in Section 16161.
  2. Hazardous Areas:
    - a. In the areas designated as Hazardous and where explosionproof work is shown or specified, all work shall meet the requirements of the NEC for the classification of that location.
    - b. Equipment enclosures shall be approved for use in the atmosphere of the area in which they are installed, i.e., Class I, Division 1, Group D; Class I, Division 2, Group D atmospheres.
  3. Wet Locations - Where installed outdoors or in areas designated as wet locations, all work shall meet the requirements of these Specifications and of the NEC for wet locations.
  4. Corrosive Areas - All equipment shall be corrosion resistant in areas so designated unless specified otherwise.
- F. Rigging and Moving Equipment - CONTRACTOR and his subcontractors shall exercise extreme care and caution in moving and installing equipment. Skilled riggers shall be employed to move any equipment over 300 pounds or of sufficient bulk. Proper falsework, skids, blocking, runways, supports of new or existing work, or other devices shall be employed when moving or placing equipment.
- G. Diagrammatic Drawings
1. Circuit diagrams shown are diagrammatic and functional only and are not intended to show exact circuit or wiring layouts, number of fittings or other installation details. The CONTRACTOR shall furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting and other electrical systems shown.
  2. Circuits beyond their pushbutton and control device and conduits containing lighting circuits beyond panelboards are not always shown or scheduled.
  3. The number of conductors shown is not necessarily the correct number required. CONTRACTOR shall install as many conductors as are required for the complete and satisfactory operation of all systems.
- H. Conductor Sizing - Conductor sizes are shown for equipment branch circuits extending less than 100 feet from power source. Refer to schedule in this section for sizing conductors on circuits more than 100 feet long. Conduit sizes shall change accordingly.

## PART 2 MATERIALS AND EXECUTION

### 2.01 RACEWAYS, FITTINGS AND BOXES

- A. Raceways
1. Type A - Rigid Galvanized Steel Conduit (RGS)
    - a. Application - Unless otherwise indicated on the Contract Drawings or under this Section, all wiring shall be run in Type A conduit.

- b. Description - Hot dipped galvanized rigid steel conduit, shall conform to ASA C80-1.
  - c. Cold galvanize all exposed conduit threads.
  - d. Manufacturers
    - 1) Allied
    - 2) Wheatland.
    - 3) Republic.
    - 4) Or equal.
- 2. Type D - Rigid Non-metallic Conduit Schedule 40 (Polyvinyl Chloride PVC)
  - a. This conduit shall be used in ductbanks and above 6 feet above slabs in corrosive areas. This type of conduit shall be not used for stub-ups from ductbanks. Stub-ups shall be Type E.
  - b. Description - Rigid, non-metallic conduit, shall be rigid PVC, Schedule 40 and shall conform to Federal Specifications W-C-1094 and Underwriters Laboratories, Inc. Standard UL-651.
  - c. Manufacturers
    - 1) Pittsburgh Standard (RobRoy Industries).
    - 2) Allied.
    - 3) Carlon
    - 4) Or equal.
- 3. Type D-1 - Rigid Non-metallic Conduit Schedule 80 (PVC)
  - a. Application – This conduit shall be used in interior corrosive areas from the floor up to 6 feet above the floor (except for signal and instrumentation systems, which shall be Type E) and for ground conductor protection.
  - b. Description - Rigid, non-metallic conduit, shall be rigid PVC, Schedule 80, and shall conform to Federal Specifications W-C-1094 and Underwriters Laboratories, Inc. Standard UL-651.
  - c. Manufacturers
    - 1) Pittsburgh Standard (RobRoy Industries).
    - 2) Allied.
    - 3) Carlon
    - 4) Or equal.
- 4. Type E – PVC-Coated Rigid Steel Conduit with an Interior Urethane Coating
  - a. Application - For exterior ductbank stub-ups from 36 inches below grade (measured along conduit) up to and through the walls or to the connected exterior enclosures. For all conduit applications in the sampling manhole. For signal or instrumentation conduit systems in interior corrosive areas.
  - b. Description – PVC-coated, rigid steel conduit. Shall conform to Federal Specification WWC-581d and be coated with a heat polymerizing adhesive prior to plastic coating. PVC coating shall be applied by plastisol method. Conduit shall bear the ETL Verified PVC-001 label to signify compliance to adhesion performance standards. The interior coating shall be a factory-applied two-part 2 mil thick chemically cured hot dipped urethane coating. The conduit shall conform to NEMA Standard No. RNI-1986.
  - c. Manufacturers
    - 1) Pittsburgh Standard (RobRoy Industries).
    - 2) KorKap.
    - 3) Permacote.
    - 4) Or equal.
- 5. Type G - Liquid-tight Flexible Conduit
  - a. Application - For use as final connection to instrumentation devices, motors, and other vibrating equipment, except Type G-2 shall be used in corrosive areas.
  - b. Description - Liquid-tight, flexible conduit shall be flexible galvanized steel case with extruded polyvinyl chloride jacket.



- c. Manufacturers
      - 1) Pittsburgh Standard (RobRoy Industries).
      - 2) Anonconda
      - 3) Triangle
      - 4) Keystone
      - 5) O.Z. Gedney
      - 6) Or equal.
  - 6. Type G-2 - Non-Metallic, Liquidtight Flexible Conduit
    - a. Application - For use in interior corrosive areas.
    - b. Description - Liquidtight flexible non-metallic conduit. Conform to UL 1660 consisting of hard PVC spirals with extra flexible thin-wall PVC coating.
    - c. Manufacturers
      - 1) Carlon Carflex.
      - 2) Thomas & Betts Xtraflex.
      - 3) Hubbell Poly Tuff.
      - 4) Or equal.
  - 7. Type K - General Purpose Auxiliary Gutters
    - a. Application - For use as called for on the Contract Drawings inside and in non-classified areas only.
    - b. Description - General purpose auxiliary gutters or wireways shall be formed, heavy gage sheet steel, hinged cover with captive screw closure, steel covers, bonderized with baked enamel finish.
    - c. Manufacturers
      - 1) Square D.
      - 2) General Electric.
      - 3) Or equal.
  - 8. Type K-2 – Non-Metallic Auxiliary Gutters
    - a. Application - For use as called for on the Contract Drawings in interior corrosive locations.
    - b. Description – Snap cover lay-in PVC wireway.
    - c. Manufacturers
      - 1) Egaline by Carolon.
      - 2) Or equal.
- B. Conduit Fittings
  - 1. All Metallic Fittings – Cast-type material and coatings shall match conduit system it is to be used with.
  - 2. Non-metallic fittings shall be PVC Schedule 80.
  - 3. Covers shall be of the same material as the fittings to which they are attached. Provide gaskets for exterior use and for interior corrosive areas.
- C. Expansion Fittings
  - 1. Material shall match conduit system it is to be used with, designed for 4-inch movement.
  - 2. Coupling shall compensate for the following movements:
    - a. Axial expansion or contraction.
- D. Access Fitting and Pulling Fitting - Of the same construction as conduit fittings. Provide cover gasket for interior corrosive locations and exterior areas. For corrosive areas, use PVC or fiberglass boxes.
- E. Boxes
  - 1. Outlet and Device - Of the same construction as conduit fittings. Provide cover gasket in corrosive locations.

2. Junction and Pullboxes - Of the same construction as conduit fittings. Up to 100 cubic inches. Larger interior non-classified area boxes shall be galvanized with hinged covers. Larger interior corrosive area boxes shall be non-metallic with hinged covers. Exterior areas shall be stainless steel. Provide cover gasket in exterior or corrosive locations. Provide terminal strips for joining conductors in boxes over 100 cubic inches.
- F. Elbows - Factory made by same manufacturer as couplings or conduit. Material to match conduit system it is to be used with.
- G. Miscellaneous
1. Nipples, Locknuts, and Bushings - Factory made; material to match conduit system it is to be used with.
- H. Conduit and Core Hole Sealing - Mechanical link type with elastomeric links joined by stainless steel bolts, which also serve to expand the seal. Manufacturer - Thunderline Corporation, Model "Linkseal." Shall be fire rated when used in firewalls.

## 2.02 CONDUCTORS AND ACCESSORIES

- A. Conductors: Application - Material - Manufacturers
1. Service - Entrance Cable (in conduit or direct burial in earth)
    - a. Application - For use from the point of connection from the switchboard or switchgear to the service disconnect in the motor control center.
    - b. Description - Type RHW/USE.
      - 1) Conductor - Copper.
      - 2) Insulation Voltage Rating - 600 volts.
      - 3) Insulation Material - XLP (cross-linked polyethylene) or EP.
    - c. Manufacturers
      - 1) Anixter - Model 3B.
      - 2) Okonite Company - Model 112-32-3.
      - 3) Manhattan - Model M8628.
      - 4) Or equal.
  2. Multi-Conductor Power and Control Cable
    - a. Application - For use in place of building wire and cable when powering three-phase equipment or for consolidating the number of power and control cables between two locations.
    - b. Description - Multi-conductor, Type TC cable.
      - 1) Conductor - Stranded copper.
      - 2) Insulation Voltage Rating - 600 volts.
      - 3) Insulation Material - PVC with phase indicators for individual conductors and nylon or PVC for overall jacket.
    - c. Manufacturers
      - 1) Anixter - Model 3G.
      - 2) Cablec - Model AP14321.
      - 3) Belden - Tray cable.
      - 4) Or equal.
  3. Building Wire and Cable
    - a. Application - For general use for all conductor applications unless specifically called out otherwise. Not for use as instrumentation cable or in manufactured control panels, service entrance cable, and submersible cable.
    - b. Description - Single conductor insulated wire type as indicated below.
      - 1) Conductor - Stranded copper only.
      - 2) Insulation Voltage Rating - 600 volts.
      - 3) Insulation Type - Type THHW/THWN for feeders and branch circuits.
      - 4) Insulation Material - PVC or thermoplastic with nylon overall jacket.

- c. Manufacturers
    - 1) Triangle PWC, Inc. – Model TP-220TH, TP-230TN.
    - 2) Anixter - Model 6G.
    - 3) Okonite - Model 116-67.
    - 4) Or equal.
- 4. Twisted Instrumentation Cable (Interior)
  - a. Application - For signal or instrumentation wiring and use where called for on Contract Drawings.
  - b. Description - Single or multi, twisted pair and twisted triad cable with overall shield.
    - 1) Conductor - Stranded copper, Size 19 AWG.
    - 2) Insulation Voltage Rating - 600 volts.
    - 3) Insulation Material - Color coded PVC for individual conductors and nylon or overall jacket.
    - 4) Shielding – 100 percent overall aluminum or aluminum/polyester foil.
    - 5) Drain - Tinned copper wire.
  - c. Manufacturers
    - 1) Alpha - Model 2471 (2421).
    - 2) Belden - Model 8719 (8760).
    - 3) Or equal.
- 5. Twisted Instrumentation Cable (Exterior and Ductbanks)
  - a. Description - Single and multi-twisted pair cable with overall shield.
  - b. Conductor - Stranded copper, size 16 AWG.
  - c. Insulation Voltage Rating - 600 volts.
  - d. Insulation - PVC.
  - e. Shielding, Single Pair - Aluminum/polyester tape.
  - f. Drain - Tinned copper drain wire.
  - g. Overall Jacket - Nylon.
  - h. Manufacturers
    - 1) Okonite Company - Type P-OS, Model 264.
    - 2) Belden Model 9342.
    - 3) General Cable BICC, No. 125986
    - 4) Or equal.
- 6. Submersible Motor Conductors
  - a. Description - Submersible, non-hazardous, extra heavy usage.
  - b. Conductor - Stranded copper.
  - c. Insulation Voltage Rating - 600 volts.
  - d. Insulation - EPD and CP or EP (ethylene propylene) with phase indicators.
  - e. Manufacturers
    - 1) Anixter - Model 4 PC.
    - 2) Okonite
    - 3) Cable supplied with and as part of the manufacturer's standard product offering.
    - 4) Or equal.
- 7. Bonding and Grounding Conductors
  - a. Application - For use as needed to meet the requirements of this specification as shown on the Drawings and the NEC for bonding and grounding.
  - b. Description - Multi-conductor cable, insulated conductor is twisted into pairs.
    - 1) Conductor - Bare copper wire.
    - 2) Stranding - Solid ASTM B-1 for Sizes No. 8 and smaller. Stranded ASTM B-8 for Sizes No. 6 and larger.
    - 3) Grounding system conductor from inside equipment to exterior grounding rods or plates and under ductbanks shall be tin-plated. Note: This is a special item; order well in advance of installation.
  - c. Manufacturers
    - 1) Anixter - Model 1A or 1B.

- 2) Cablec - Molded “bare and coated copper conductors” listed under Section 7, “Special Purpose Cables.”
    - 3) Or equal.
  8. Control Panel Wire
    - a. Application - For use in all manufactured or custom built control panels and motor control centers.
    - b. Description - 90 degrees C machine tool wire.
      - 1) Conductor - Minimum size AWG #18, 19 strand, but must handle current requirements.
      - 2) Insulation - PVC, 2/64-inch for 600 V service.
    - c. Manufacturers
      - 1) Carol - Catalog Series 7600.
      - 2) Anixter - Catalog Series 6W.
      - 3) Or equal.
- B. Wire Terminations and Connectors
1. General
    - a. Connector material shall be compatible with the wire that it is to be used with.
    - b. Connectors made of aluminum shall not be used with copper conductors.
    - c. Connectors listed below are for use with copper wire.
  2. Terminal Block Manufacturer
    - a. Control Wiring
      - 1) Buchanan - Model 0241.
      - 2) Connectron - Model NSS3.
      - 3) Phoenix Contact.
      - 4) Or equal.
    - b. Equipment Power Wiring
      - 1) Buchanan - Model 416.
      - 2) Connectron - Model NC3.
      - 3) Or equal.
  3. Two-Way Splices
    - a. Description - Tubular compression type for conductors 1/0 and larger. Rated 600 VAC and uninsulated.
    - b. Manufacturer
      - 1) Burndy - Model YS-L “Hylink.”
      - 2) Thomas & Betts - Model 545.
      - 3) 3M Model 10000.
      - 4) Or equal.
  4. Crimp Connectors
    - a. Description - For branch circuit connections, other than lighting and receptacle circuits.
    - b. Manufacturer
      - 1) Ideal - Series 30; Model 410, 411, 412 with Model 415 and 417 insulator.
      - 2) Thomas & Betts - Model PT66M,
      - 3) Or equal.
  5. Bus or Lug Terminals, Manufacturer - 600 VAC, Crimp Type
    - a. Burndy “HYLUG” Catalog, Series YA.
    - b. Ideal - Catalog Series CCL and CC.
    - c. Or equal.
  6. Terminal Strip Connectors
    - a. Description - For control and instrumentation connections to terminal strips. Locking fork, vinyl, self-insulated, crimp-type connectors or tubular clamp type.
    - b. Manufacturers
      - 1) Burndy - “VINYLUK” Types TP-LF and BA-EL.
      - 2) Thomas & Betts - Catalog Series 18RA, 14RB, and 10RC.
      - 3) Ideal - Series 83-7.

- 4) Or equal.
- 7. Wire Nuts
  - a. For Unclassified Areas - Hexagonal-shaped for use with a nut driver, compact swept-wings, ribbed cap, UL-listed for 600V with temperature rating of 105 degrees C (221 degrees F).
    - 1) Ideal - Models 341 and 342.
    - 2) 3M - Models 212, 312, and 512.
    - 3) Buchanan - Models B-1, B-2, and B-4.
    - 4) Or equal.
  - b. For Outdoor and Corrosive Areas - Compact swept-wings, ribbed cap, filled with non-hardening sealant, UL listed for 600V with temperature rating of 105 degrees C (221 degrees F).
    - 1) Ideal - Model DB Plus.
    - 2) Buchanan - Model BTS2 and BTS4.
    - 3) Or equal.
- 8. Bolted Wire Connectors - Mechanical connectors for all combination of copper and aluminum conductors. Connectors shall be of a compact high-strength design, tin-plated copper alloy, two-piece connector, and shall utilize two hex head bolts.
  - a. Burndy - Model KVSU.
  - b. Ideal.
  - c. IlSCO Corp.
  - d. Or equal.

## 2.03 GROUNDING

- A. Install ground system as shown on the Contract Drawings by installing driven ground rods into the ground a minimum of 12 inches below grade. Where rods cannot be driven due to rock formations, install grounding plates below groundwater level of a minimum of 6 feet below grade. Depth of the system conductors is to be 30 inches minimum. Use approved mechanical connections to rods. Ground rods shall be steel core copper jacketed rods; 3/4-inch diameter by 10 feet long.
- B. Size of grounding and bonding conductors shall be as shown but not smaller than required by the NEC, Articles 250-66 and 250-122.

## 2.04 PANELBOARDS

- A. General
  - 1. Interiors
    - a. All interiors shall be completely factory assembled.
    - b. Panelboards shall be double row construction.
    - c. Neutral bars to be full size and insulated. Neutral bussing to have suitable lugs for each feeder. In subfeed panels, neutral shall be isolated from ground.
    - d. Provide a ground bus in each panel.
  - 2. Boxes, Panelboard - Provide at least minimum gutter space in accordance with the NEC.
  - 3. Trim
    - a. Provide barriers as required for completely dead-front construction.
    - b. Provide minimum projection, chrome-plated latch with key lock on panelboards. Key all locks alike.
    - c. Provide heavy plastic cover over permanent directory.
  - 4. Bus Bars - All main bus bars shall be tin-plated copper sized in accordance with UL Standards to limit the temperature rise on any current carrying part to a maximum of 50 degrees C above air ambient of 40 degrees C maximum.

- B. Equipment Panelboard (EP)
1. Definition – Equipment panelboards are to operate on 480Y/277 volt, 3 phase power. Equipment panelboards shall not have a main circuit breaker larger than 250 amps. Equipment panelboards shall not have branch circuit breakers larger than 100 amps.
  2. Panelboard Breakers - Molded case, thermal magnetic trip, bolt-on connection, quick-make, quick-break, toggle handle circuit breakers. Two- and three-pole units to be internal common trip type (handle ties not allowed) with silver alloy contacts.
  3. Main Circuit Breakers - Rated at 35,000 A.I.C.
  4. Panelboards for use at 480 or 600 volts AC maximum to incorporate branch circuit breakers as shown or scheduled rated at 18,000 A.I.C. symmetrical at 480 volts.
  5. Provide equipment panelboards as the following panels:
    - a. Wastewater Treatment Plant EP-1.
  6. Design Basis - Square D Model NF.

## 2.05 DISCONNECT AND SAFETY SWITCHES

- A. Definitions
1. Disconnect Switches - Non-fusible switches.
  2. Safety Switches - Fusible switches.
- B. Characteristics
1. Heavy-duty type construction.
  2. Number of poles shall be equal to the number of current carrying conductors.
  3. Lockable in “off” or “open” and in the “on” or “closed” position.
  4. Quick-make, quick-break switch mechanism.
  5. Dual cover interlock to prevent opening of the switch door when handle is in the “on” position, and to prevent closing of switch mechanism with the door open. Provide a defeat mechanism.
  6. Visible blade construction.
  7. Single throw unless noted otherwise.
  8. All main service disconnects shall come with a AR Type” fuse rejection kit.
- C. Ratings
1. 600 volts for 480V systems and 240 volts for 208V systems. Ampere or horsepower rating as shown or required.
  2. RMS symmetrical interrupting rating shall be 100,000 amperes for main service, 10,000 amperes otherwise.
  3. Lugs shall be rated and U.L. listed for 60 degrees C and 75 degrees C wires.
- D. Enclosures
1. U.L. listed.
  2. NEMA 4X stainless steel for exterior locations; NEMA 4X non-metallic for corrosive areas; all others NEMA 12.
  3. Provide with enclosure-mounted handle operator, operating through approximately 180-degree arc.
- E. Fuses - Dual element RK1 current limiting type, time delay. Bussman Low-Peak LPN-RK or equal.
- F. Manufacturers - Heavy-duty Square D Class 3110; General Electric Type TH; Westinghouse Type H-600; or equal.

## 2.06 ELECTRICAL SUPPORTS, ANCHORS, AND FASTENERS

- A. See Section 16191.

## 2.07 NAMEPLATES AND LABELS

- A. Nameplates
  - 1. Material - Rigid laminated plastic.
  - 2. Lettering Height - 5/16-inch high.
  - 3. Lettering Color - Black.
  - 4. Background Color - White.
- B. Labels
  - 1. Self-debossing, aluminum foil type.
  - 2. Typewritten or preprinted black legends on white background.
  - 3. Permanent Pressure-Sensitive Adhesive – Provide for all conduit. Provide high temperature adhesive for labels on heat producing devices.
  - 4. Use preprinted sleeve type for conductors. Label at each termination or splice.
  - 5. Manufacturers - Seton or equal.
- C. Equipment and Control Identification
  - 1. In addition to the requirements of the National Electrical Code, install an identification label which will clearly indicate information required for use and maintenance of items such as panelboards, control panels, motor controllers (starters), disconnect and safety switches, separately enclosed circuit breakers, individual breakers and controllers in motor control centers and other control panels, control devices and other significant equipment.
  - 2. Provide nameplates for all electrical equipment and controls.
  - 3. Attach nameplates with stainless steel or other non-corrosive metallic rivets or screws.
  - 4. Provide a nameplate at each remote switch or control device when the controlled function is not readily identifiable.
  - 5. All wiring except primary service and major power conductors shall have each end of the conductor labeled. Label wires at each junction box.

## 2.08 SPARE DEVICES

- A. Provide the following spare devices:
  - 1. Two of each type and size of all fuses.

## PART 3 EXECUTION

### 3.01 CONDUIT INSTALLATION

- A. Conduit System Fabrication
  - 1. All interior conduit shall be installed exposed.
  - 2. No conduit shall be run on the exterior face of any structure unless specifically shown exposed or approved by the ENGINEER prior to installation.
  - 3. Conduit Defects - All conduit runs to be free of indentations, cuts in coatings, elliptical sections, blisters, and other defects. Repair or replace damaged conduit sections as instructed by the ENGINEER.
  - 4. Conduit Cutting - Cut all conduit ends square and remove all burrs. Cut conduit ends exactly to avoid excessive penetration into boxes.
  - 5. Expansion Joints - Provide approved conduit expansion joints wherever conduit crosses a structural expansion joint; is attached between two separate structures; the conduit run is 100 feet or more in a single length for Types A and E; or wherever shown or specified. Support conduit on each side of the expansion joint, except for exterior stub-up only support above expansion joint.
  - 6. Preparation for Conductor Installation - Prior to pulling cables in any conduit system, thoroughly clean the inside of each length of conduit by swabbing or the use of compressed air to remove all foreign matter. Then temporarily plug the ends of each conduit to prevent the entrance of dirt or foreign matter.

7. Couplings
    - a. Tightly butt ends of conduit into the couplings.
    - b. In exposed work only, where standard couplings cannot be used, only union-type couplings are permitted or as otherwise acceptable to the OWNER.
  8. Cutting of Structures - Keep the cutting of walls or floors for conduit to a minimum. Where such cutting is absolutely necessary, take care so as not to weaken the walls or floor involved. Do not cut beams or other structural supports under any condition.
  9. Connection to Devices - Conduit attachment to all electrical equipment, such as sheet steel junction boxes, pullboxes, switches, etc., to be made with approved fittings with non-metallic bushings.
  10. Conduit Bends and Elbows
    - a. Rigid Metallic Conduit Systems (Types A and E)
      - 1) Heating metal conduit to facilitate bending is strictly prohibited.
      - 2) Field bending metal conduit is permitted as follows:
        - a) Types A and E - Up to and including 3/4-inch size.
      - 3) For all rigid metal conduit larger than that above, use manufactured elbows or use hydraulic one-shot bender to fabricate bends.
      - 4) Make all bends with radius no less than N.E.C. requirement.
    - b. Rigid Non-Metallic Systems (Types D and D-1)
      - 1) Join non-metallic conduit using cement as recommended by manufacturer. Wipe non-metallic conduit with appropriate cleaner, then dry before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
      - 2) Field bending of Types D and D-1 conduit is permitted only if a "hot box" is used.
      - 3) Make all bends with radius no less than NEC requirement.
      - 4) Kinked or crimped conduit bends are not acceptable. Remove and replace all such bends.
  11. Routing of Conduits - Keep the number of bends, offsets, and crossovers to a minimum; however, not more than three 90-degree elbows or equivalent bends up to 270 degrees is to be installed in any run between pulling or access fittings.
  12. Structural - Make holes around conduit or cables watertight or gas-tight via silicone or acrylic latex masonry sealant upon completion of conduit or cable system.
- B. Conduit Size - Minimum conduit sizes shall be as follows unless specifically shown otherwise:
1. 3/4-inch for exposed locations.
  2. 2-inch for any conduit in ductbanks (unless specifically shown otherwise).
- C. Changes in Conduit Sizes - Made at pull or junction boxes except where specifically shown via a pull fitting.
- D. Conduit and Sleeve Sealing
1. Seal inside of conduit (after installing and testing conductors) where passing through exterior walls or walls containing vapor seals or required to be gastight. Sealing may be accomplished by locating junction or approved sealing fitting at wall and filling with an approved waterproof electrical putty or sealing compound. Seal around all interior conduit passing through wall boxouts.
  2. Where driptight and watertight NEMA 4X and 12 installations are required, use only watertight hubs for top or side entry. Locknuts with gaskets are not acceptable. Conduits entering the top of electrical equipment are to either be sealed or located in such a manner as to prevent water from entering the equipment through the conduit system. Install conduit for ease of sealing.
  3. Core drill all concrete and masonry walls, new or existing. Make cores 1-inch minimum, larger than O.D. of conduit.



- E. Exterior Walls - Use core drilled hole. In masonry wall, seal with non-shrink grout to within 3/4-inch of wall face. Seal gastight and watertight with silicone acrylic latex masonry sealant. Fill hollow masonry voids with grout.

In concrete wall, seal around conduit with modular neoprene links and stainless steel compression bolts (link seals).

- F. Access Fittings
1. May be used as required to facilitate installation of conductors or where shown.
  2. Provide access fittings or conductors, as manufacturer recommends so as not to damage conductor or insulation during conductor pulling operations.
- G. Pull and Junction Boxes - All pull and junction boxes shall be installed where shown or specified. Additional boxes may be installed as required to facilitate installation of conduit system.

### 3.02 CONDUCTOR INSTALLATION

- A. Installation
1. Install products in accordance with manufacturers' instructions.
  2. Do not pull thermoplastic wire at temperatures below 35 degrees F.
  3. Protect exposed cable from damage.
  4. Provide Kellem support grips when electrical cables hang in a vertical, sloping, or horizontal position.
  5. Neatly train and lace wiring inside boxes, equipment, and panelboards.
  6. Install electrical circuit loadings as designed on Contract Drawings unless approved otherwise by ENGINEER.
  7. Where instrumentation cables are installed in panels, etc., the CONTRACTOR shall arrange wiring to provide maximum clearance between instrumentation cables and other conductors. Instrumentation cables shall not be installed in the same bundle or conduit with conductors of other circuits.
  8. Intrinsically safe conductors shall be in separate conduits both inside and outside enclosure and shall be terminated on terminal strips with barriers. Barriers are to physically isolate intrinsically safe conductors from non-intrinsically safe conductors.
  9. Installation in Concrete Manholes and Handholes - Neatly bundle conductors and train them around the outside (long way around) of the enclosure. Support conductors from hooks or cable supports inside of enclosure.
  10. Wiring Diagrams
    - a. Any wiring diagrams shown on plans for hookup of equipment furnished by others are approximate and are for bidding purposes only.
    - b. Obtain wiring diagrams, certified correct for the job, from respective supplier for all equipment and systems furnished by them.
    - c. Install all work in accordance with certified wiring diagrams.
  11. CONTRACTOR to provide all power, control, and signal wiring and conduits between system components (including installation of any conductors supplied by other trades), including final connections to labeled terminal strips integral in equipment, as shown on Drawings, and in accordance with approved manufacturer's wiring diagrams.
- B. Color Coding
1. Provide color coding for all service, feeder, branch, control, fire alarm, and signaling circuit conductors.
  2. Grounded Conductor Color Coding in New Installations
    - a. Ground – Green.
    - b. Neutrals – White for 120V systems; gray for 277V systems.\*

\*Exception - Where neutrals of more than one system are installed in the same raceway or box, each neutral shall be white or gray with a different colored (not green) stripe.

3. In addition to existing facilities, ungrounded conductors in different voltage systems shall match the existing system and/or be as follows:
  - a. 120/208-volt, 3 phase:
    - Phase A - Black
    - Phase B - Red
    - Phase C - Blue
  - b. 277/480-volt, 3 phase:
    - Phase A - Brown
    - Phase B - Orange
    - Phase C - Yellow
  - c. 120/208-volt, single phase: Red and black
  - d. DC Power - Positive Lead = Red.  
- Negative Lead = Black.
  - e. DC Control - Positive = Brown.  
- Negative = Blue.
  - f. 120-volt Control Wiring - Single conductor AC control wire shall be red, except a wire entering a motor control center compartment or control panel, which is an interlock, shall be color coded yellow.
  - g. 24-volt AC Control Wiring - Orange.
  - h. Neutral (Grounded Conductor) - White or gray.
  - i. Grounding Conductor - Green.

C. Conductor Sizing

1. Conductor sizes that are shown for equipment branch circuits are the minimum sizes allowed. Refer to Schedule in paragraph 3.02.C.2.c. below for sizing conductors on circuits longer than the minimum length shown for the various voltages. Adjust conduit sizes accordingly.
2. Wiring shown without size to be sized by one of the following methods, whichever is larger. No additional payment will be made for oversized conduit or conductor.
  - a. Power and Lighting Circuits - Minimum size No. 12 AWG. Quantity as required for proper operation. Use 3/4-inch conduit types as required for the area where conduit is installed.
  - b. Control Circuits - Minimum size No. 14 AWG. Quantity as required for proper operation, use 3/4-inch conduit, type as required for the area where conduit is installed.
  - c. Increase minimum size conductors for 20 ampere single phase circuits where distance between power source and item served exceeds noted length in accordance with the following table. No more than 2 percent voltage drop of all branch circuits at equipment's rated full load current is permitted.

120 VOLTS	100' to 150'	#10	151' to 225'	#8	226' up	#6
208/240 VOLTS	100' to 175'	#10	175' to 250'	#8	251' up	#6
265/277 VOLTS	125' to 200'	#10	201' to 300'	#8	301' up	#6
460/480 VOLTS	225' to 350'	#10	351' to 525'	#8	526' up	#6

- d. Minimum size of branch circuits over 20 amps per requirements of NEC Tables 310.16 thru 310.31.
3. Neutral Wire - To be equal to ungrounded wires unless otherwise shown.
4. Ground Wire - Minimum size as required by the NEC Table 250-122.

- D. Spare Conductors - Wherever groups of control and instrumentation conductors are required, provide the following minimum numbers of spare conductors. As required, CONTRACTOR shall increase conduit sizes shown to accommodate spare conductors. Terminate at terminal strips on both ends and mark as spare and indicate the location of opposite end.

CONDUCTORS	SPARES
Up to 10	4
11 to 18	6
19 and over	8

### 3.03 CONDUCTOR STRANDING

- A. All conductors shall be stranded.

### 3.04 CONNECTORS AND TERMINATIONS

- A. Use manufacturer's standard lugs for connection of conductors to equipment panel or devices.
- B. Use UL approved and specified wire nuts for small power circuits and for other circuits, and compression connectors for connection of conductors to other conductors.
- C. Terminal Board Terminations - All interconnecting instrumentation wiring to terminal boards and strips to be made with insulated crimp type connectors (locking fork type). Stranded wire is not to be directly connected to terminals without the use of connectors unless the terminations are specifically made to accept bare stranded wire, i.e., tubular clamp type termination. No loose strands shall be permitted outside of the connector, whichever is utilized.
- D. Motor Connections
  - 1. Motors Less Than 1 HP - Use wire nut appropriate for the environment where the motor is located.
  - 2. Motors From 1 to 20 HP - Use branch circuit crimp-type connectors.
  - 3. Motors Above 20 HP - Use bolted wire connectors. Insulate the connector with insulating putty to at least 7/64 inch and tape the insulated connection with two layers half lapped of neoprene splicing tape. Taping shall be "courtesy wrapped" or "back-taped" for ease of removal in the future.
- E. Splicing - Make splices in accessible locations and in junction boxes. No splices will be permitted in pulling fittings or MCC wiring spaces.

### 3.05 GROUNDING

- A. Maintain electrical integrity of conduit system throughout. Provide bonding jumpers at fittings as required; jumpers to be no longer than required. Provide separate ground wire for all conduit systems and where grounding integrity is doubtful.
- B. Basic intent of grounding specification is that grounding conductor be completely separate from system neutral and that neutral only be connected to ground at the main service grounding point. Run equipment ground independently back to main service ground. Use separate insulated (green) grounding conductors for all grounding conductors. Where ground passes through panels and disconnects, braze ground lugs to panel or disconnect housings. Isolate neutral bus or lug from ground. Ground all conduits at each panel.
- C. Shielding to be continuous and grounded at one point only unless otherwise required by equipment manufacturer's recommendations.

### 3.06 ELECTRICAL SUPPORTS, ANCHORS, AND FASTENERS

- A. See Section 16191.

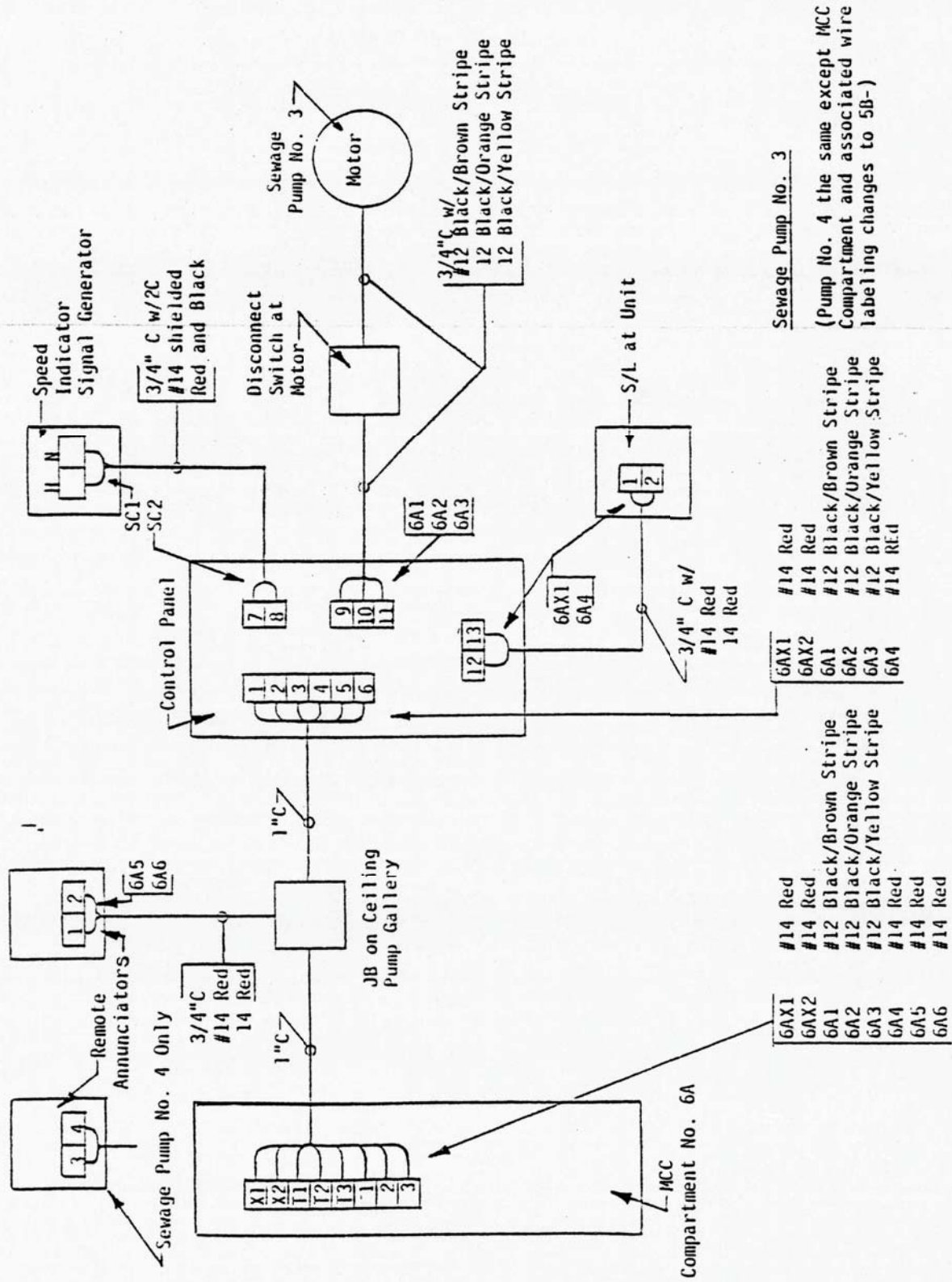
3.07 EQUIPMENT TESTING (600 VOLTS AND BELOW)

- A. See Section 16950.

3.08 EQUIPMENT AND DEVICE MOUNTING HEIGHTS

- A. Mounting heights are as follows, unless otherwise noted:
  - 1. Switches - 45 inches to the center.
  - 2. Enclosed Starters or Circuit Breakers
    - a. Wall Mounted - 66 inches to top.
    - b. Interior Mounting Stand/Exterior Not on Tank – 36 inches to center of operating handle for equipment less than 60 inches high.
    - c. Exterior Mounting on Tanks – 36 inches to center.
  - 3. Control or Starter Panels - See Section 16161.
  - 4. Panelboards - 66 inches to top.
  - 5. Disconnect Switches - See Section 16161.

SAMPLE  
BLOCK DIAGRAM LAYOUT



**EXHIBIT A**

**TESTING AND INSPECTION  
ELECTRICAL INSULATION TEST RECORD  
INSULATION RESISTANCE TEST**

EQUIP. I.D. CKT/MARK NO.	TEST VOLTA GE	PHASE TO GND. MEG OHMS				PHASE TO PHASE MEG OHMS						DATE TESTED
		A	B	C	N	A-B	A-N	B-C	B-N	C-A	C-N	

TEST EQUIPMENT CONTROL NO. \_\_\_\_\_

REMARKS: \_\_\_\_\_

\_\_\_\_\_

PERFORMED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
Test ENGINEER

END OF SECTION

## SECTION 16161

### CONTROL PANELS AND ENCLOSURES

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Hinged cover enclosures.
- B. Cabinets.
- C. Terminal blocks.
- D. Control stations.
- E. Accessories.

##### 1.02 RELATED SECTIONS

- A. All Division 1 Sections.
- B. Section 09900 - PAINTING.
- C. Section 16055 - ELECTRICAL WORK.
- D. Section 16191 - ELECTRICAL SUPPORTS, ANCHORS AND FASTENERS.
- E. Section 16196 - ELECTRICAL SYSTEM IDENTIFICATION.
- F. Section 16475 - OVERCURRENT PROTECTIVE DEVICES.
- G. Section 16900 - AUXILIARY CONTROLS AND RELAYS.

##### 1.03 REFERENCES

NEMA 250	Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ICS 4	Terminal Blocks for Industrial Control Equipment and Systems
ANSI/NFPA 70	National Electrical Code
UL	Underwriters Laboratories, Inc.

##### 1.04 SUBMITTALS

- A. Submit under provisions of Sections 01331 and 16055.
- B. Submit shop drawings for all control panels. The submitted information shall be detailed specification information proving compliance to these Specifications. Submittals shall include, but not be limited to, the following:
  - 1. Enclosure information including size and NEMA classification.
  - 2. Subpanel layout.
  - 3. Wiring diagrams and elementaries.
  - 4. Bill of materials.
  - 5. Internal components (specification information, cut sheets).

- 6. List of nameplate titles.
- 7. Dimensions.
- C. Shop drawings shall be submitted for all materials used as enclosures.
- D. Submit equipment and material samples as requested by the ENGINEER.
- E. Manufacturer's Instructions - Indicate application conditions and limitations of use stipulated by product testing agency specified under Article 1.06. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

#### 1.05 DEFINITIONS

- A. Power Wiring - Shall mean conductors, conduit, wireway and connections, and related electrical work to supply electrical power to equipment, including electrical power to supply point for equipment control systems.
- B. Control Wiring - Shall mean conductors, conduit, wireway, construction and related work to connect or interconnect relays, solenoids, contact devices, signal lights and audible signals, as well as any and all other electrical control devices indicated as related to the control functions.
- C. Control Panel (CP) - Is an enclosure used to house logic or power devices such as CPT, starters, contactors, relays, timers, and may also contain pilot devices.
- D. Control Station (CS) - Is an enclosure used to house pilot devices only, such as pushbuttons, indicating lights, and selector switches.

#### 1.06 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to authority having jurisdiction, as suitable for purpose specified and shown.

#### 1.07 EXTRA MATERIALS

- A. Furnish under provisions of Sections 01730 and 01780.
- B. Provide two of each cabinet key.
- C. Provide a box of each size and type of control circuit fuses.
- D. Provide three of each size and type of 3 phase power fuse.
- E. Provide one of each size and type of single phase power fuse.
- F. Provide one of each color L.E.D. pilot light.

#### 1.08 WORK INCLUDED

- A. All control panels required elsewhere in these Contract Documents.



PART 2 PRODUCTS

2.01 MANUFACTURERS - NEMA 4X STAINLESS STEEL

- A. Hoffman - Model Series SSLP.
- B. Saginaw.
- C. Rittel.
- D. Or equal.

2.02 MANUFACTURERS - NEMA 4X NON-METALLIC

- A. Carlon - Model "Himeline" Series HL.
- B. Hoffman.
- C. Rittel.
- D. Or equal.

2.03 MANUFACTURERS - NEMA 12 SINGLE DOOR

- A. Hoffman - Model Series LP.
- B. McKinstry.
- C. Or equal.

2.04 MANUFACTURERS - NEMA 12, TWO-DOOR AND FREE STANDING

- A. Hoffman - Model Series ULP and FS.
- B. McKinstry.
- C. Or equal.

2.05 SHEET METAL ENCLOSURE FABRICATION

- A. After fabrication and assembly of all sheet metal enclosures, grind all welds smooth, and then thoroughly degrease and clean.

Apply at least two coats of rust inhibiting primer or undercoat of the manufacturer's standard quality followed by at least two coats of baked enamel or epoxy finish. For exterior enclosures utilizing an epoxy finish, the enclosure shall have a final overcoat of clear acrylic polyurethane.

Finish Color of All Enclosures - ANSI 61 Light Gray.

- B. Turn back edges and file all sharp corners smooth.

- C. Enclosure Opening
  - 1. Roll lips on all sides.
  - 2. Provide neoprene gasket.
  - 3. Provide drip shield kits for exterior enclosures.
- D. Doors
  - 1. Rolled lips on unhinged sides (three sides).
  - 2. Full length piano type hinges.
  - 3. Provide all front or rear panel doors with door holders sized appropriately for the weight of the equipment on the door.
  - 4. NEMA 4X and 12 Door Latches - Quick release 1/4 turn operation.
  - 5. Hinged doors over 24 inches high shall have latching device at three points.
  - 6. Provide mechanical interlock between door and panel power disconnect mechanism. The interlock is to prevent the door from opening while the disconnect switch is closed. Provide an unlabeled defeater mechanism to permit qualified personnel access to panel while it is powered.

## 2.06 ACCESSORIES

- A. Manufacturer - Cable Ties
  - 1. Thomas & Betts - Model Nylon TY-WRAPs.
  - 2. Or equal.
- B. Manufacturer - Terminal Blocks
  - 1. Buchanan - Model 0241.
  - 2. Connectron - Model N553.
  - 3. Or equal.
- C. Manufacturer - Wire Duct
  - 1. Stahl Brothers - Model XT-Panel Channel.
  - 2. Panduit Corporation - Model Type E-Dark Grey.
  - 3. Or equal.
- D. Manufacturer - Grounding Terminals
  - 1. Burndy - Model OA4C-AB.
  - 2. Or equal.
- E. Provide one drawing pocket in the panel, minimum size 10 inches wide by 10 inches high by 1/2 inch deep, panel manufacturer's standard material and finish.
- F. Power Disconnect Switch - Built in to flange of enclosure with door interlock. Through-the-door types will not be acceptable.

## PART 3 EXECUTION

### 3.01 ELECTRICAL CONTROLS

- A. Shall be in accordance with Section 16900.

### 3.02 POWER CIRCUIT PROTECTIVE DEVICES

- A. Shall be in accordance with Section 16475.

### 3.03 NAMEPLATES

- A. Provide nameplates on the exterior of each enclosure identifying the application or function of the enclosed equipment.
- B. Nameplates and labels per Section 16055.

### 3.04 EQUIPMENT HOUSING TYPES

- A. Enclosure, Control Panel or Device Applications – When no type is shown or specified, provide stainless steel.
  - 1. Exterior Locations - NEMA 4X stainless steel.
  - 2. Corrosive Areas - NEMA 4X non-metallic.
  - 3. All Other Areas - NEMA 12 painted

### 3.05 CONTROL PANEL CONNECTIONS

- A. Regardless of who furnishes or installs the various panels, all are connected electrically by the electrical trade unless specifically shown or specified otherwise.

### 3.06 FINISH REPAIR

- A. Repair damage to the factory finish in accordance with Section 09900. Depending on the extent of damage to the factory-finish and/or the closeness of the color match of any field-applied paint, a complete repainting may be ordered by the OWNER at his discretion.

### 3.07 DOOR QUANTITY

- A. Provide two doors if panel is larger than 36 inches wide.

### 3.08 CONTROLS AND ASSOCIATED CIRCUITRY

- A. Each control panel shall contain all applicable disconnects, including a single main power disconnect (unless specifically shown otherwise on the drawings); motor circuit disconnect - one for each motor; necessary control pushbuttons; timers; relays; door interlock switches; indicator lights; selector switches; alarms; instruments and associated circuitry to monitor and control the associated equipment. Main power disconnect operating mechanisms shall be flange mounted not through the door.

### 3.09 CONTROL PANEL WIRING

- A. Wire Type - See Section 16055.
- B. Wire Duct - Used for wiring between devices that are mounted on the back panel of control panels.
- C. Wire Bundling - Where it is not possible to run wire in wire duct, such as wire run from devices located in the back of a panel to devices mounted on the door of a panel, the wire is to be bundled. Wire lacing or twine is not acceptable.

Bundles are to be wrapped by a spiral plastic protective sheath. Secure bundles to the panel structure for a stable support with a spacing of no less than every 8 inches.

A wire bundle which must cross a hinge shall run along the hinge as far as possible or have a large loop in bundle and be secured at both ends so that the twisting is taken over the longest length of hinge possible. Wire shall not be split off from the bundle along this length.

- D. Wiring and Termination Methods - Interior wiring to be point-to-point with no splices. All wiring from and to the control panel to be through terminals located in the panel. Solderless insulated crimp-type locking fork lugs shall be used for terminations to screw-type terminals. Where screw-type terminals are not used, terminals shall be of the tubular clamp type. Install lugs such that no uninsulated wire is visible at the wire entry point, and wire strands are visible but not protruding from the screw connections end. Use solderless connectors or tubular clamp connectors for all connections to terminals and equipment.
- E. Shielded Wire - Separate from other wires and equipment with suitable barriers and with terminal blocks for continuous shield grounding to the connecting cables.
- F. Separate intrinsically safe wiring from all other wiring with barriers.
- G. Furnish panels factory-wired and tested with all equipment and appurtenances mounted thereon.
- H. Wire Labeling - Mark wires at both ends with numbers from ENGINEER-approved elementaries per Section 16055. Color coding per Section 16055.
- I. Panel Wiring - All panel wiring shall be installed by the panel manufacturer.
- J. Lamp Test Switch – For panels with more than five indicating lights. Provide a single lamp test switch in lieu of push-to-test type indicating light.

### 3.10 TERMINAL BLOCKS

- A. Arrange terminals in alphabetic and numeric order in columns on removable subplates. Locate columns at least 4 inches from any edge of the subplate and space 6-inch on centers and at least 2 inches from a wiring duct.
- B. Provide marked terminals with wire number from ENGINEER-approved elementaries. Locate terminals with the same wire number adjacent to each other and jumpered.
- C. Make a maximum of two connections to each side of a terminal, including jumpers.
- D. Provide an additional 20 percent spare terminals with the following as minimum requirements:
  - 1. Power Terminals - Two spares.
  - 2. Control Terminals - Ten spares.
- E. At least one position on a terminal block must be reserved for termination of each incoming wire. Locate all such positions on the same side of the column of terminals. A wiring duct to feed the terminals must be sized to include wires for these positions.
- F. Connect all ground terminals of power receptacles solidly to the frame of the panel. Provide the panel with one grounding terminal in the control panel. Mount grounding terminals to the frame of the panel or rack.

### 3.11 WIRING DUCT

- A. Size wiring duct at 60 percent fill according to the maximum number of wires at any cross section, including field wiring terminations and spares. Wiring duct must be plastic.

### 3.12 CONTROL PANEL INSTALLATION

- A. Wall mount panel enclosures that are up to 48 inches in height; floor mount larger panel enclosures.

- B. Furnish control panels, where shown, with power disconnect switches which will de-energize the power supply to the panel.
- C. Ground Panels - Connect all equipment and circuits in the panels shown or required to be grounded to the grounding conductors.
- D. Install panels where shown. Provide conduit entry as shown or specified or required for the installation.
- E. Upon completion of installation, the equipment manufacturer's representative shall check panels and make necessary adjustments.
- F. Panel manufacturer to mount all equipment shown or specified to be furnished with a panel. Furnish panels as completely assembled units.
- G. For all wall-mounted panels, provide a minimum of four brackets designed for wall mounting.

### 3.13 MOUNTING HEIGHT

- A. No disconnect handle is higher than 6 feet 6 inches to the highest part of handle. Mount all separately enclosed circuit breaker disconnect switch handles 4 feet 6 inches from floor or other working surface unless otherwise indicated (5 feet to the top of enclosure).
- B. Top of wall-mounted enclosures shall not be higher than 6 feet.
- C. No pilot device is higher than 5 feet 6 inches.
- D. No operator interface device (i.e., graphic display screen, etc.) is higher than 5 feet 0 inches to the centerline of the device.

### 3.14 ENCLOSURE INSTALLATION METHODS

- A. Support - Adequately support all enclosures from walls, structure, or on support panels or plates independently of the conduit system. Provide additional supports for seismic restraint.
- B. Support Material - Size fasteners utilizing a safety factor of 5.
- C. Mounting Accessories - Section 16191.
- D. All panels and enclosures shall be installed level and plumb.

END OF SECTION

## SECTION 16191

### ELECTRICAL SUPPORTS, ANCHORS AND FASTENERS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Conduit and equipment supports.
- B. Anchors and fasteners.

##### 1.02 REFERENCES

- A. NECA - National Electrical Contractors Association.
- B. ANSI/NFPA 70 - National Electrical Code.

##### 1.03 RELATED SECTIONS

- A. Section 01331 - SHOP DRAWING PROCEDURES.
- B. Section 16055 - ELECTRICAL WORK.
- C. Section 16161- CONTROL PANELS AND ENCLOSURES.

##### 1.04 SUBMITTALS

- A. Submit under provisions of Sections 01331 and 16055.
- 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 specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

##### 1.05 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other third-party testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

#### PART 2 PRODUCTS

##### 2.01 PRODUCT REQUIREMENTS

- A. Materials and Finishes - Provide products which incorporate corrosion resistance adequate for the conditions in which they are to be installed.
- B. 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 and designing system supports.

## 2.02 STEEL CHANNEL

### A. Non-PVC Coated

#### 1. Ductile Iron

- a. Description - Hot dipped galvanized steel channel designed for use with steel fittings, spring backed washers and nuts.
- b. Manufacturers
  - 1) Kindorf.
  - 2) Uni-Strut.
  - 3) B-Line.
  - 4) Globe.
  - 5) Or equal.

#### 2. Stainless Steel

- a. Description - For the purpose of this Section, all stainless steel shall be Type 316.
- b. All fasteners, fittings, clamps, saddles and accessories shall be stainless steel.
- c. Manufacturer
  - 1) Uni-Strut.
  - 2) B-Line.
  - 3) Or equal.

### B. Polyvinyl Chloride (PVC) Coated Materials

- 1. Hanger or support shall be hot dipped galvanized including the threads.
- 2. The zinc surface shall be treated with chromic acid prior to coating to enhance the bond between metal and plastic.
- 3. All surfaces shall be coated with an epoxy acrylic primer of approximately 0.0005-inch thickness.
- 4. The PVC coating shall be applied by the liquid fluidized bed method.
- 5. The coating material shall be compounded of pure materials and shall be free of any fillers or secondary plastisizers or gross, non-uniform characteristics.
- 6. A PVC coating shall be bonded to the galvanized outer surface of the product. The bond between the PVC coating and the product surface shall be greater than the tensile strength of the plastic. The thickness of the PVC coating shall be a minimum of 0.040-inch (40 mils) and a maximum thickness of 0.045-inch (45 mils).
- 7. Finished Color - Manufacturer's standard.
- 8. Manufacturers
  - a. B-Line Systems, Inc.
  - b. Perma-Cote Industries.
  - c. Robroy Industries (Plasti-Bond Red).
  - d. Kor Kap.
  - e. Or equal.

## 2.03 FIBERGLASS CHANNEL

- A. Description - Pultruded materials of glass strands and polyester resins to form rigid, high strength, non-corrosive, non-flammable structural channels, connectors and fasteners.
- B. Manufacturers
  - 1. Robroy Industries.
  - 2. Enduro.
  - 3. Aickinstrut.
  - 4. Strut Tech.
  - 5. Or equal.
- C. All strut and hanger rods in corrosive areas shall be fiberglass manufactured in a continuous process whereby linear glass strands, continuous mat laminates, and corrosion resistant polyester resins form a uniform rigid thermoset finished shape. The fiberglass parts shall be self-extinguishing with a V-O classification in the UL 94 test for flammability. Hanger rod washers shall be stamped from protruded flat stock. Hex nuts and strut nuts shall be injection molded. Other hardware shall be PVC coated to a nominal 15 mils. The bond between metal and plastic shall be equal to or greater than the tensile strength of the plastic. Manufacturers: Robroy Industries, Kor Kap, or equal.

## 2.04 TWO-PIECE MALLEABLE IRON CLAMPS

- A. Cast malleable iron strap clamp sized to match conduit with mating malleable iron clamp backs (spacers). Clamp back shall be thick enough to provide 1/4-inch standoff from conduit to wall. Cadmium plated anchor and washer. Manufacturer - O-Z/Gedney, Thomas & Betts, Appleton, Raco, or equal.
- B. PVC coated cast malleable iron strap clamp sized to match conduit with mating malleable iron clamp back (spacer). Clamp back shall be thick enough to provide 1/4-inch standoff from conduit to wall. Stainless steel anchor and washer. Manufacturer - Robroy, Thomas & Betts, Ocal, Perma-Cote Industries, Kor Kap, or equal.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. General
  - 1. Install products in accordance with manufacturer's instructions.
  - 2. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit. Anchor conduits to or support from structural members only.
  - 3. Fasteners used to wall mount any material or equipment weighing 75 lbs or more to concrete or masonry shall be adhesive grouted Type 316 stainless steel anchors in accordance with Section 03001. All floor-mounted equipment and other wall-mounted materials or equipment weighing less than 75 lbs may be supported via drilled anchors.
  - 4. Do not use spring steel clips and clamps.
  - 5. Do not use powder-actuated anchors.
  - 6. Do not drill or cut structural members.



7. Install supports in a manner that does not interfere with or weaken the bolts when attaching to structural steel. Obtain the ENGINEER's written approval of any drilling or cutting on the structure.
8. Through spaces where surface mounting is not available, install multiple conduits on electrical channel rack, either hung or wall mounted. Provide space on each rack for 25 percent additional conduits.
9. Support conduit passing through above-grade floors so that sealing sleeves or mechanical link seals do not carry the weight of the conduit.
10. Install individual surface mounted conduit with two-piece cast malleable iron clamp assembly.
11. Install surface-mounted cabinets and panelboards with minimum of four or six anchors, depending upon the number of normal anchor points. See table at the end of this section.
12. In all locations, use stainless steel channel supports to stand cabinets, panelboards and mounting panels 1/2-inch (12 mm) off wall.
13. Finish of all supports shall be compatible with the conduit system applicable for the area classification where installed.
14. After thorough investigation of architectural, structural and shop drawings related to work to determine how equipment, fixtures, conduit, panelboards, etc. are to be supported, mounted or suspended, provide:
  - a. Extra steel bolts, inserts, pipe stands, brackets, or any other items required for proper support.
  - b. Supporting accessories where required, whether or not shown on Drawings.
15. Refer to details on the Contract Drawings for free standing and railing mounted construction and for any other details of special conditions. For other situations, the CONTRACTOR shall, prior to installation, submit mounting details to the ENGINEER for approval.
16. Coat field cuts of PVC-coated support members with matching PVC material to thickness of system coating. File smooth all cuts prior to coating.

**B. Support Applications**

1. Unclassified Areas - Galvanized steel channel system or malleable iron clamps.
2. Interior Corrosive (Polymer) Areas - Fiberglass reinforced plastic channel system.
2. Interior Wet Areas - Stainless steel channel system.
4. Exterior Areas - Stainless steel channel system.

**C. Anchor and Fastener Application Schedule - See schedule at end of this Section.**

**D. Support Spacing**

1. Metallic Conduit - Not more than 8 feet on center. Types A and E-1 within 3 feet of each outlet box, junction box, cabinet or fitting.
2. Non-Metallic Conduit
  - a. Sizes up through 1-1/4-inches diameter - not more than 3 feet on center.
  - b. Sizes 1-1/2-inches diameter and larger - Not more than 4 feet on center.
  - c. Within 18 inches of each outlet box, junction box, cabinet or fitting.

3. Maximum Deflection
  - a. Metallic Conduit -  $1/100$ th of span between supports.
  - b. Non-Metallic Conduit -  $1/360$ th of span between supports.

(continued)

# ANCHOR AND FASTENER APPLICATION SCHEDULE

ITEM CATEGORY	MOUNTING SURFACES						SHEET METAL
	WOOD, PLYWOOD	WALLBOARD, GYPSUM, FRP, COMPOSITION	HOLLOW MASONRY	SOLID MASONRY	CAST CONCRETE		
Individual conduit	F	G	D	A	A	E	
Steel/FRP channel	F, I	D	D	A	A	E	
Structures; i.e., conduit rack, cable tray	F, I	D	D	A	A	--	
Devices and equipment less than 75 lbs.	I	Note 1	D	A	A	Note 2	
Devices and equipment 75 lbs. or more (Note 4)	I	Note 2	H	B, H	B, C, H	Note 2	
Mounting panels (Note 3)	I	Note 1	D	B, H	B, C, H	Note 2	

## Key to Anchor Types:

- A - Drilled (lead insert in masonry, expansion bolt in concrete)
- B - Adhesive grouted anchor
- C - Cast-in-place insert
- D - Toggle bolt, hollow wall fastener
- E - Sheet metal screw
- F - Wood screw
- G - Sheet rock screw
- H - Through bolt
- I - Lag screw

In wet, exterior or corrosive areas, all fasteners and anchors shall be Type 316 stainless steel. In all unclassified areas, cadmium-plated fasteners shall be used, except grouted anchors shall be Type 316 stainless steel.

## Notes:

- (1) Support via plywood mounting panel lagged to studs or via electrical channel lagged to studs.
- (2) Do not mount to these surfaces.
- (3) Panels mounted to masonry or concrete surfaces shall have 1/2-inch air space between surface and panel via stainless steel spacers.
- (4) Provide two additional support connections; minimum of four or six, depending on number of normal connection points. This requirement may necessitate fabricating the additional connections. Maintain NEMA rating of enclosure.

END OF SECTION

## SECTION 16475

### OVERCURRENT PROTECTIVE DEVICES

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Circuit breakers below 600 volts.
- B. Device fuses.

##### 1.02 RELATED SECTIONS

- A. Section 01331 - SHOP DRAWING PROCEDURES.
- B. Section 01562 - PROTECTION OF THE WORK AND PROPERTY.
- C. Section 01620 - EQUIPMENT - GENERAL.
- D. Section 01640 - TRANSPORTATION AND HANDLING OF MATERIALS AND EQUIPMENT.
- E. Section 16055 - ELECTRICAL WORK.
- F. Section 16161 - CONTROL PANELS AND ENCLOSURES.
- G. Section 16191 - ELECTRICAL SUPPORTS, ANCHORS AND FASTENERS.
- H. Section 16480 - VARIABLE FREQUENCY DRIVES.
- I. Section 16486 - MOTOR CONTROL CENTERS.

##### 1.03 REFERENCES

NECA (National Electrical Contractors Association) "Standard of Installation"	
NEMA AB 1	Molded Case Circuit Breakers
NFPA 70	National Electrical Code
NEMA FU 1	Low Voltage Cartridge Fuses

##### 1.04 SUBMITTALS

- A. Submit under provisions of Sections 01331 and 16055.
- B. Product Data - Provide catalog sheets showing ratings, trip units, time current curves, dimensions, and enclosure details.
- C. Manufacturer's Installation Instructions - Indicate application conditions and limitations of use stipulated by product testing agency specified under Article 1.05. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- D. Samples as requested by the ENGINEER.

## 1.05 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Circuit Breakers - Conform to requirements of NEMA AB-1 and UL 489.
- C. Furnish products listed and classified by UL or other third-party testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Circuit Breakers
  - 1. Square D.
  - 2. Cutler Hammer.
  - 3. General Electric.
  - 4. Or equal.
- B. Motor and Device Fuses, Unless Otherwise Noted
  - 1. Bussman - Model RU5.
  - 2. Gould-Shawmut - Model TRI-ONIC.
  - 3. Or equal.

### 2.02 GENERAL REQUIREMENTS

- A. Circuit breakers shall be of the molded case type.
- B. Shall consist of the number of poles, ampere rating and interrupting rating as shown or specified.
- C. Molded case circuit breakers shall have overcenter toggle-type mechanism, providing quick-make, quick-break action. Mechanism shall be mechanically trip-free from the handle so the contacts cannot be held closed against short circuit currents.
- D. Multiple pole breakers shall be common trip type.
- E. ON and OFF positions shall be clearly marked and color coded.
- F. All breakers in panels for switching duty shall be "SWD" or "T" rated, for switching duty.
- G. Breakers 250 ampere frame and larger shall have interchangeable trip.
- H. All main service breakers shall have 100 percent ampere rating and shall be service entrance rated.
- I. Breakers over 100 ampere frame size shall have front adjustable magnetic trip elements to provide instantaneous tripping over a range of 400 to 1000 percent of the continuous ampere trip rating.
- J. Service Conditions
  - 1. Temperature – 104 degrees F (40 degrees C).
  - 2. Altitude – 1,000 feet (330 M).
- K. All breakers shall be of the bolt-on type.
- L. Dimensions and Performance - NEMA FU 1, Class as specified or indicated.
- M. Voltage - Provide fuses with voltage rating suitable for circuit phase-to-phase voltage.

## 2.03 CONTACTS

- A. Contacts shall be non-welding under rated operating conditions.
- B. Silver-to-silver type.
- C. Provide with suitable arc interrupting devices.

## 2.04 TERMINATIONS

- A. Circuit breakers shall have lugs that accommodate wire sizes shown on the Contract Drawings, including additional lugs where shown or required.
- B. Lugs shall be UL listed for copper conductors only.
- C. Breakers shall be UL listed for mechanical-type lugs.

## 2.05 GROUND FAULT PROTECTION

- A. 100 ampere frame circuit breakers or less.
  - 1. Integral with circuit breaker.
  - 2. Push to test.
  - 3. Reset feature.
  - 4. Trip indication.
  - 5. 0.8-second maximum pickup time.

## 2.06 RATINGS

All circuit breakers shall meet or exceed the following unless otherwise noted on the Contract Drawings or Specifications.

FRAME SIZE MAXIMUM CONSTANT CURRENT-AMPS	NEMA* INTERRUPTING CAPACITY SYMMETRICAL-AMPS	POLES	MAXIMUM VOLTAGE RATING
100	10,000 @ 120 volts	1	120
100	10,000 @ 240 volts	2,3	240
100	18,000 @ 480/277 volts	1	480
100	18,000	2,3	600
250 Branch	25,000	2,3	600
250 Main	35,000	2,3	600
400 Branch	30,000	2,3	600
400 Main	35,000	2,3	600
1000 Branch	30,000	2,3	600
1000 Main	65,000	2,3	600

\*Interrupt ratings are at 480 volts unless noted otherwise.

## 2.07 BREAKER TRIP CHARACTERISTICS

All breakers shall be Type A thermal magnetic type unless noted otherwise on the Contract Drawings or specified.

- A. Thermal Magnetic Type (Type A)
  - 1. Long time, nonadjustable, thermal overload, trip.
  - 2. Instantaneous, electromagnetic trip.
  - 3. Ambient compensating.
  - 4. "Push-to-trip" test button.
- B. Integral Magnetic and Solid State Trip Type (Type B)
  - 1. Provide solid state logic programmer.
  - 2. Long delay, range adjustable trip.
  - 3. Magnetic pick up, range and time adjustable, trip.
  - 4. Integral power supply.
  - 5. 100 percent equipment rated.
  - 6. Integral ground fault protection where noted on the Contract Drawings or specified.
  - 7. Ground fault system neutral current transformer for each breaker equipped for ground fault.
  - 8. "Push-to-trip" pushbutton.
  - 9. Adjustable rating plug type.
- C. Motor Circuit Protectors (Type MCP)
  - 1. Each pole shall provide instantaneous short circuit protection.
  - 2. MCP shall have provisions for adjusting the instantaneous magnetic trip element.
  - 3. All poles shall be constructed to open, close, and trip simultaneously.
  - 4. The MCP mechanism shall be the transient inrush suppressor type appropriate for the protection of energy efficient motors.

## 2.08 DEVICE FUSES

- A. Provide as required by the device manufacturer.

## PART 3 EXECUTION

### 3.01 GENERAL

- A. Circuit breaker trip ratings shown on the Contract Drawings are maximum for the specific application.
- B. Breakers shall be removable from the front of the panel or board without disturbing adjacent units.
- C. All breakers shall be suitably mounted in an enclosure in accordance with Section 16161 and supported in accordance with Section 16191.
- D. Individual-mounted circuit breakers shall be provided with NEMA enclosures and installed at locations shown on Drawings and as required by NE Code at approximately 60-inches from floor to top of enclosure.

### 3.02 HANDLE OPERATORS

- A. All enclosures for individually-mounted circuit breakers shall have enclosure-mounted handle operators, operating through approximately 180-degree arc. Flush mounted circular rotating handle operators are unacceptable.

3.03 DISCONNECTING MEANS - LOCKING

- A. For separately-mounted circuit breakers and disconnect switches, provide locking-type handles to be locked in both the ON (closed) or OFF (open) positions.

3.04 IDENTIFICATION

- A. Circuit breakers shall be provided with uniformly designed nameplates to clearly indicate the type, rating, listing/recognition/certification marks, and other information as defined in UL 489 in accordance with Section 16055.

3.05 TERMINALS

- A. All terminals shall comply with UL 486A and B and CSA 1165 Standards. Torque markings shall be provided and followed per UL 489.
- B. Terminals shall be amply sized, including adapters or special lugs to connect the conductor(s) as shown, specified or required.

3.06 RATINGS - FUSES

- A. Main distribution fuses shall be sized as shown on the Contract Drawings.
- B. Device fuses shall be sized as per the manufacturer's requirements in accordance with the NEC.

3.07 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 16950.
- B. Inspect and test each circuit breaker 250 amperes and larger to NETA ATS-2007.
- C. Inspect each circuit breaker visually, per NETA ATS-2007.
- D. Perform several mechanical ON-OFF operations on each circuit breaker.
- E. Verify circuit continuity on each pole in closed position.
- F. Determine that circuit breaker will trip on overcurrent condition, with tripping time to NEMA AB 1 requirements.
- G. Include description of testing and results in test report.

3.08 ADJUSTING

- A. Adjust work under provisions of Section 16950 and the manufacturer's recommendations.
- B. Adjust trip settings so that circuit breakers coordinate with other overcurrent protective devices in circuit.
- C. Adjust trip settings to provide adequate protection from overcurrent and fault currents.

END OF SECTION



## SECTION 16480

### VARIABLE FREQUENCY DRIVES

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. This Section covers the requirements for variable frequency drives (VFDs).
- B. Provide the hereinafter specified equipment as part of the systems called for in the specifications and on the Contract Drawings.
- C. Provide VFDs for the following equipment as detailed in individual equipment specifications and as shown on the Contract Drawings:
  - 1. Coagulation Basin Blowdown Pumps.
  - 2. Thickened Sludge Pumps.
  - 3. Coagulation Basin Dewatering Pump.
  - 4. Polymer Feed Systems.
  - 5. Belt Filter Press Systems.
  - 6. Distribution Box Mixer .

##### 1.02 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 01730 - INSTALLATION DATA.
- E. Section 11305 - HORIZONTAL CENTRIFUGAL SOLIDS HANDLING PUMP.
- F. Section 11320 - THICKENED SLUDGE PUMPS.
- G. Section 11325 - DEWATERING PUMP.
- H. Section 11333 - POLYMER FEED SYSTEM.
- I. Section 11335 - THICKENER-CLARIFIER SLUDGE COLLECTION EQUIPMENT.
- J. Section 11350 - BELT FILTER PRESS.
- K. Section 11351 - MECHANICAL MIXING EQUIPMENT.
- L. Section 14602 - HOISTS AND MONORAIL.
- M. Section 16055 - ELECTRICAL WORK.
- N. Section 16161 - CONTROL PANELS AND ENCLOSURES.
- O. Section 16486 - MOTOR CONTROL CENTERS.

### 1.03 REFERENCES

- A. The latest revisions of the following standards and specifications are incorporated herein by reference and form a part of this Specification to the extent that sections or portions of section are applicable hereto.
  - 1. National Electric Code (N.E.C.).
  - 2. Underwriter's Laboratories, Inc. (U.L.) - U.L. 508.
  - 3. National Electrical Manufacturers Association (NEMA):
    - a. NEMA - 1C - 1
    - b. NEMA ICS 3.1
    - c. NEMA 250
  - 4. American National Standards Institute (ANSI).
  - 5. Standards for Industrial Control (J.I.C.).
  - 6. Institute for Electronic and Electrical Engineering (IEEE) - IEEE 519.

### 1.04 SYSTEM DESCRIPTION

- A. Performance Criteria
  - 1. Drives shall be capable of varying the speed of the driven device over the full speed range required while providing sufficient torque to the motor as required for the work being done.
  - 2. Drives shall be sufficiently sized for the full load amperage of the drive motor as tabulated at the end of this section. Should the next size larger drive be required, these shall be provided at no additional cost to the OWNER.
- B. Harmonic Reduction – In MCC-Bus A-1-2, provide an “active”-type harmonic filter with disconnect and fusing and MCC door-mounted HMI. Final size shall be as recommended by the manufacturer. Filter shall exceed the requirements of IEEE 519 at the input of the MCC. Unit shall be Schneider Elect AccuSine or equal.
- C. Distance to Drive - Output reactors or filters shall be provided when required. The manufacturer shall either provide output reactors/filters or a written certification stating their drives will operate satisfactorily as specified without reactors or filters, based on the specific distance from the drive to the motor.

### 1.05 SUBMITTALS

- A. Submit in accordance with Sections 01331 and 16055.
- B. Submit a written description of the sequence of operation for each set of VFDs.
- C. Submit dimensional data for each VFD. Include as a minimum: height, width, depth, distance from bottom of enclosure to center line of disconnect handle, conduit openings, size and location of cooling vents.
- D. Submit drawings showing interior enclosure layout and panel door layout.
- E. Submit elementary diagrams and block diagrams for each VFD system. Indicate how/where remote equipment is wired to each VFD system. Show both internal and external devices.
- F. Submit manufacturer's literature containing information needed to prove conformance with these specifications.
- G. Provide a copy of the manufacturer's programming and maintenance software for each manufacturer's drives or groups of drives if software varies.

## 1.06 QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing the products specified in this section with minimum 10 years' experience.
- B. The VFD supplier shall have service facilities within 300 miles of the site.

## 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle equipment to site under provisions of Section 01640.
- B. Deliver in 36-inch maximum width shipping splits, individually wrapped for protection and mounted on shipping skids.
- C. Store in a clean dry space. Maintain factory wrapping or provide a heavy canvas or heavy plastic to protect units from dirt, water, debris, and traffic. The CONTRACTOR shall replace any equipment damaged during shipping, handling, or storage.

## 1.08 WARRANTY

- A. The VFD and all appurtenances shall be warranted in accordance with Section 01620.
- B. In addition to the CONTRACTOR's warranty period identified in the General Conditions, the VFD shall be warranted by the manufacturer for two years. The warranty period shall begin upon acceptable startup of each system of drives. The warranty shall cover all parts and labor necessary to repair equipment which is inoperable due to defects in material or workmanship.

# PART 2 PRODUCTS

## 2.01 MANUFACTURERS

- A. Whenever possible, all VFDs provided shall be by the same manufacturer.
  - 1. Square 'D' - Altivar 61 or 71 Series (design basis).
  - 2. No substitutions.
- B. All materials and equipment furnished shall be current products of manufacturers regularly engaged in the manufacture of VFD and for which replacement parts are available.

## 2.02 PULSE-WIDTH MODULATED VARIABLE FREQUENCY DRIVE

- A. General
  - 1. The CONTRACTOR shall furnish and install the complete VFD system(s) described in this specification and as shown on the Contract Drawings.
  - 2. Drives shall be six-pulse microprocessor controlled with digital display and programming/status key pad. One copy of the vendor programming software shall be provided to the customer.
  - 3. The VFDs shall be rated for the full horsepower and full load amperes and rpm of the equipment as indicated. Motor service factors shall be minimum 1.0, unless otherwise specified in respective equipment Sections. VFDs shall be specifically designed to provide continuous speed adjustment of three phase, inverted duty, NEMA design 'B' squirrel cage motors.  
The VFD applications shall be for the systems listed in Table 16480-1 at the end of this section.
  - 4. Complete configured VFD system shall be U.L. listed per U.L. 508.
  - 5. Minimum efficiency shall be 95 percent at motor full load. Unit service factor shall be minimum 1.0.

6. All VFDs shall be provided under this section except where noted otherwise.
- B. Construction
1. The VFDs shall be housed in the MCC as shown. Provide replaceable, cleanable filters in enclosure cooling fan/vent openings. Each VFD MCC compartment shall also house other components, such as control power transformers, relays, circuit breakers, thermal overloads, reactors and filters, and other devices when such are necessary to achieve conformance to the specified system or as shown on the Drawings.
  2. An input circuit breaker or fusible disconnect switch shall be supplied for the VFD. The circuit breaker or fusible disconnect switch shall have an external operator. Interlocking provisions shall prevent unauthorized opening of the VFD compartment door while the handle is in the "on" position. A defeater shall be provided.
  3. The VFD shall be capable of converting 480 volt, 3 phase, 60 Hz power to a fixed potential DC bus level. The DC voltage shall be inverted to an adjustable frequency pulse width modulated (PWM) sine coded output waveform. The drive shall utilize solid state full wave diodes and IGBT power transistors.
  4. The VFD shall be insensitive to the phase rotation of the AC line and shall not cause displacement power factor of less than 0.95 lagging under any speed or load condition.
  5. The VFD shall have the following ratings:
    - a. Minimum efficiency of 95 percent at rated load.
    - b. Overload Rating
      - 1) Constant Torque - 150 percent rated current for 1 minute.
      - 2) Variable Torque - 110 percent rated current for 1 minute.
    - c. Ambient operating temperature of 0 degrees C to 40 degrees C continuously, without derating.
    - d. Operating humidity of 5 to 90 percent, non-condensing.
  6. The following basic control features shall be provided standard on each VFD:
    - a. Local-Off-Remote Switch - When this switch is in the "Local" position, the VFD shall start and stop using the keypad, and the speed will be keypad selectable. When this switch is in the "Off" position, the VFD shall be off. When this switch is in the "Remote" position, the VFD shall start and stop via remote Modbus TCP/IP input. VFDs shall be capable of both 3 and 4 wire control for remote starting and stopping. Each VFD shall be Ethernet ready and be able to be controlled over the Ethernet network. When the selector switch is in "Remote," the PLC will control the VFD.
    - b. Unidirectional operation, programmable acceleration and deceleration, restart into spinning loads. Implementation of the programmable acceleration and deceleration ramping shall be achieved without the programming of devices external to the VFD. The VFD supplier shall provide acceleration and deceleration ramp programming as requested by the ENGINEER during system startup.
    - c. Full time torque limit, adjustable. Reduces speed to shed load when over current conditions exist.
    - d. Programmable torque performance from 4 to 60 Hertz. CONTRACTOR shall coordinate with manufacturer of each motor controlled by a VFD. Program minimum VFD speed per motor manufacturer's recommendations to avoid overheating the motor.
    - e. Integral AC power line reactors or integral/remote harmonic filters without capacitors. See paragraph 1.04.B. Filters shall be connected after the drive input disconnecting means.
    - f. Frequency stability of 0.5 percent for 24 hours with voltage regulation of +2 percent of maximum rated output voltage.
    - g. Status indication for the following:
      - 1) Power On
      - 2) Run
      - 3) Motor Direction
      - 4) Overcurrent
      - 5) Over temperature
      - 6) High and Low Phase Loss

- 7) Current Limit
- 8) Ground Fault
- h. Control power transformer (CPT) for 120 volt AC power for operator devices.
- i. Motor slip dependent speed regulation.
- j. Minimum one cycle logic power carry-over during loss of power.
- k. Programmable automatic restart upon the return of power following a power outage.
- l. Automatic restart after any drive fault, minimum three attempts and shutdown with manual reset.
- m. Critical frequency rejection or lockout.
- n. Programmable preset speeds, minimum of three.
- o. Local speed potentiometer and speed indication, configurable in either rpm, percent of full speed, or hertz via the keypad.
- p. Fault log for minimum of last three faults.
- q. Isolated process instrument follower input signal of 4-20mA DC, grounded or ungrounded.
- r. 4-20mA DC output proportional to 0 to 100 percent speed.
- s. Provide auxiliary run output contacts for remote run indication. Run output contacts shall be wired to programmable VFD contacts.
- t. All wiring connections to the VFD shall be made on labeled terminal strips in accordance with Section 16161.
- u. Common local and remote start/stop contacts, and protective automatic shutdown contacts/switches shall be used by the control circuits of both the VFD and the bypass contactor when specified.
- v. VFD shall support Modbus TCP/IP protocol through supplied integrated Ethernet/IP port supplied by VFD manufacturer. No third-party interfaces will be acceptable.
- 7. The following protective features shall be provided standard on each VFD:
  - a. AC input line current limiting fuses for short circuit fault protection of AC to DC converter sections (not shown on elementary diagrams).
  - b. Electronic over current trip for instantaneous or timed overload protection.
  - c. Under voltage and phase loss protection.
  - d. Over frequency protection.
  - e. Over temperature protection.
  - f. Surge protection from AC line transients.
  - g. Electrical isolation between power and logic circuits.
  - h. Ground fault protection.
  - i. VFD enable terminals. Normally closed, field mounted protective devices, (such as auxiliary contacts on disconnect switches, emergency stop pushbuttons, high discharge pressure switch, low suction pressure switch, high motor temperature switches - see CONTRACTOR Drawings and system specifications) shall be wired in series across the enable terminals.
  - j. Provide a minimum of three sets of programmable output contacts for remote alarm indication. Programmable VFD output contacts shall be provided with a minimum of two normally open and two normally closed contacts, rated for 10 amps at 120 volts.
  - k. LCD or LED diagnostic display.
  - l. Password protection for VFD programming.
- 8. The following VFD operating parameters shall be capable of being independently adjusted on the VFD:
  - a. Minimum Speed - 4 to 40 hertz (see paragraph 2.02.B.6.d.).
  - b. Maximum Speed - 40 to 90 Hertz.
  - c. Acceleration Time - 2 to 300 seconds.
  - d. Deceleration Time - 2 to 300 seconds.
  - e. Low Frequency Boost - up to 46 volts.
  - f. Volts per hertz.
  - g. Current limits up to 110 percent for variable torque VFDs, up to 150 percent for constant torque VFDs.
  - h. Starting torque up to 150 percent.

- i. Programmable Constant Torque - Variable torque switching.
- 9. The following, manufacturer installed options shall be furnished with the VFDs as shown or specified:
  - a. AC output contactors.
  - b. Motor overcurrent relay on VFD.
  - c. Surge suppression unit shall be self-contained; meet UL 1449 and UL 1283; have repeatable surge current capability for long life; meet ANSI/IEEE C62.41, Category A, B, and C3 compatible, ANSI/IEEE C62.11, C62.45 tested. Protection modes shall be L-N, L-L, L-G, and N-G (where applicable), with a response time of 0.5 nanoseconds. Provide L.E.D. status lights plus isolated dry contacts for system integrity monitoring. Unit shall be sized by the VFD manufacturer and be Liebert, AccuVar ACV Series, Best, Eaton, or equal.

## PART 3 EXECUTION

### 3.01 GENERAL

- A. Supply the VFD(s) with the controls specified herein and shown on the Contract Drawings.
- B. The CONTRACTOR shall arrange for the VFD manufacturer or supplier to furnish the services of a qualified representative to check and supervise the installation and the preliminary testing for not less than one day, to supervise final functional performance testing for not less than two days, and to instruct the OWNER's operator(s) in proper operation at the time of final system acceptance for not less than one day. The representative shall also provide and additional one day of training during the warranty period at a date requested by the OWNER. A day is defined as eight hours. All days are actual on-site time. Travel and subsistence is the responsibility of the manufacturer's/supplier's representative.
- C. Videotape the OWNER's training (digital) and leave a copy with the OWNER. A full complete session may be made for one system that is typical for all systems. The video shall separately cover all adjustments, parameter changes, troubleshooting and diagnostic testing for each drive, and any specifics which may vary for individual systems. If the tape is not of good quality, as determined by the OWNER, the CONTRACTOR shall redo the videotaping at his cost.
- D. Three copies of a complete operations and maintenance manual shall be submitted to ENGINEER in accordance with Section 01781 and 16055.
- E. Field wiring shall be per manufacturers' recommendations.

### 3.02 INSTALLATION

- A. The VFDs 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 review the method of installation for the variable frequency drives with the MCC/VFD manufacturer.
- C. 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.
- D. A manufacturer's representative shall supervise, check or assist in the installation of the VFDs as required by Section 01730.

- E. The manufacturer's representative shall provide a written report stating the installation meets all of the manufacturer's requirements and is ready for functional testing.

### 3.03 FUNCTIONAL FIELD TESTING

- A. Functional field tests shall be conducted on the variable frequency drives 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 functional field testing is to ensure the proper installation, setup and operation of equipment or systems. Testing includes all testing, measuring and adjusting of equipment or systems by the CONTRACTOR and/or manufacturer's representative prior to system startup and 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.
- F. Field testing shall be as specified herein.
- G. The CONTRACTOR shall coordinate VFD testing such that both the OWNER and the ENGINEER are available to witness the testing. The CONTRACTOR shall contact both the ENGINEER and the OWNER two weeks prior to the proposed test date. The representative of the equipment run by the VFD (pumps, fans) shall be present during VFD testing.
- H. Shop drawing shall be available during testing.
- I. A copy of the operations and maintenance manual shall be available during testing.
- J. The CONTRACTOR shall verify that all systems have been electrically connected and that equipment is ready for operation.
- K. Testing/Verification/Documentation
  - 1. General explanation of each system shall be made.
  - 2. CONTRACTOR/manufacturer/supplier shall have a written tabulation of all adjustable/settable parameters as set from the factory. In a separate column, all of the actual field adjusted/set values shall be shown.
  - 3. Demonstrate the following and show how each is set/changed.
    - a. Manual operation both local/remote.
    - b. Minimum or default speed to be set for specific equipment operation.
    - c. Maximum set speed.
    - d. Adjust acceleration/deceleration times for proper equipment operation.
    - e. Restart after power outage.

- f. Demonstrate starting into rotating motor (shut off circuit breaker and turn right back on).
- g. Overcurrent/overvoltage (simulate with test equipment).
- h. Over temperature/low voltage (simulate with test equipment).
- i. Phase Loss - Remove on fuse on supply voltage.
- j. Auto operation (from input current or voltage signal).
- k. Output contacts for alarm/run/status, etc., operate as required, simulate with test lights.
- l. Unit(s) shall operate without unusual or undue noises or vibrations.

#### 3.04 SYSTEM DEMONSTRATION TESTING AND REPORTING

- A. Demonstration tests shall be conducted on the VFDs. Testing consists of extended duration operation, under actual working or design conditions, of all facility equipment and systems, as outlined herein. Installation and all other field testing and adjustments to equipment and systems shall be completed and checked by a manufacturer's representative prior to system demonstration testing. A manufacturer's representative shall be present during system demonstration testing. A startup report outlining the results of the testing shall be prepared by the manufacturer's representative and submitted to the ENGINEER.
- B. System demonstration tests shall be conducted in accordance with the manufacturer's instructions and requirements.
- C. Deficiencies identified during the system demonstration tests shall be corrected and the test shall be restarted to show complete compliance with the Contract Documents.
- D. All labor, equipment, special tools or apparatus and supplies required for system demonstration tests shall be supplied by the CONTRACTOR.

#### 3.05 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 as required herein. The manufacturer's representative shall be available to perform the services listed, for the durations listed herein.
- B. The manufacturer's representative shall prepare a written startup report at the conclusion of performance testing. The startup report shall include an installation certification and shall be submitted directly to the ENGINEER.
- C. CONTRACTOR to provide a written certification that the VFD installations (list each system) were started up, adjusted for proper operation for the driven load, tested, and are operating properly and in accordance with the Contract Documents and the manufacturer's requirements.

END OF SECTION



## SECTION 16484

### CONTACTORS AND MOTOR STARTING EQUIPMENT

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Manual motor starters.
- B. Motor starters.
- C. Magnetic contactors.
- D. Motor starting switches.

##### 1.02 RELATED SECTIONS

- A. Section 01331 - SHOP DRAWING PROCEDURES.
- B. Section 01620 - EQUIPMENT - GENERAL.
- C. Section 16055 - ELECTRICAL WORK.
- D. Section 16161 - CONTROL PANELS AND ENCLOSURES.
- E. Section 16191 - ELECTRICAL SUPPORTS, ANCHORS, AND FASTENERS.
- F. Section 16486 - MOTOR CONTROL CENTERS.

##### 1.03 REFERENCES

- A. UL listing is required for all factory-fabricated assemblies. Individual component listing is also required.
- B. Size equipment per NEMA and UL standards to match motor or equipment controlled.
- C. The following specifications and standards, except as hereinafter modified, are incorporated herein by reference and form a part of this specification to the extent indicated by the references thereto. The issue in effect at time of construction shall be applicable. In text, such specifications and standards are referred to by basic designation only.
  - 1. National Electric Code (NEC).
  - 2. Underwriters Laboratories, Inc. (UL) - UL-508.
  - 3. National Electrical Manufacturers Association (NEMA).
    - a. NEMA-1C-1
    - b. NEMA AB-1 - Molded Case Circuit Breakers
  - 4. American National Standards Institute (ANSI).
  - 5. J.I.C. Standards for Industrial Control.

#### 1.04 SUBMITTALS

- A. Submittals shall be made in accordance with Sections 01331 and 16055.
- B. Shop drawings shall be submitted for all starters and contactors. The submittal shall contain all the information needed to prove conformance with these specifications.
- C. Submit elementaries and block diagrams for systems of relays and/or contactors.
- D. Samples shall be submitted as may be requested by the ENGINEER.

#### 1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with NECA Standard of Installation.
- B. Maintain one copy of each document on site.

#### 1.06 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other third-party testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.

### PART 2 PRODUCTS

#### 2.01 GENERAL

- A. All equipment furnished shall be of one approved manufacturer where possible. Manufacturers are Square D Company, General Electric Company, Allen-Bradley, or equal.
- B. For control panels with motors less than 1/2 HP, starters may be IEC rated motor protective switches. All other starters shall be NEMA rated starters.
- C. Construction:
  - 1. Parts easily removable when subject to wear, arcing damage, or electrical failure.
  - 2. Enclosures - Cold rolled, formed seam-welded steel or cast aluminum with suitable legend plates and NEMA enclosures as per Section 16161.
  - 3. Overload Protection
    - a. Magnetic Starters
      - 1) Melting Alloy or Bi-metal - For all motors including those with internal protection, of proper size to match the controller. One sensing device per ungrounded motor lead. Exception: Windings used only during motor starting and automatically disconnected when the motor is running may be unprotected. Units shall be "standard," "slow," or "fast" response as required for the type motor and load per the suppliers' recommendations. Size heaters per manufacturer's table supplied with the starter for the actual motor full load current and enclosure indicated on the motor nameplates. Temperature compensating motor starter overloads where or when required.

- 2) Solid State - Overload relay, self powered, current sensing, phase unbalance and phase loss protection, NC standard trip contacts, visible trip indication, trip test function, power LED. Provide auxiliary NO contact (convertible to NC). Adjust solid state overload settings to match motor manufacturers nameplate motor data.  
Manufacturers - Square D, General Electric, Allen-Bradley, or equal.
- b. Manual Starters - Thermal overloads in each phase leg or one for each motor winding. Use Type A for fractional horsepower and Type B for integral horsepower applications.
4. Auxiliary Contacts - Rated as required by interlocking and/or automatic control systems as indicated in these Specifications and/or on the Contract Drawings. Minimum 2 NO and 2 NC auxiliary contacts required.

## 2.02 MANUAL STARTERS

### A. General:

1. Contact Mechanism - Quick make, quick break toggle action.
2. Contactors - Silver alloy.
3. Enclosures - Adequately sized to contain the starter and all accessories and/or modification. NEMA classification to meet requirements of Section 16161.

### B. Fractional HP Type:

1. Two-pole (unless shown or specified otherwise).
2. Toggle operated (unless shown or specified otherwise).
3. Full voltage.
4. Shall be non-reversing, reversing or two-speed as shown or specified.
5. Thermal overload device for each phase or motor winding.
6. Lock-off provisions and neon pilot light.
7. Selector switch as required, labeled for function performed.
8. General Electric Class CR101; Square D Class 2510, 2511, 2512 Type F; Cutler-Hammer Type B330AN; or equal.

### C. Integral HP Type:

1. Two- or three-pole polyphase.
2. Thermal overload device for each phase.
3. Full voltage, non-reversing, reversing or two-speed as shown or specified.
4. Pushbutton operated with handle guard and lockoff.

5. Neon pilot light(s).
6. Auxiliary contacts as required.
7. Low voltage protection to trip unit on power outage when shown or specified.
8. General Electric Class CR1062; Square D Class 2510, 2511, 2512 Type M; Cutler-Hammer Type B100; or equal.

D. Manual Starting Switches:

1. Two - or three-pole as shown or required.
2. Toggle operated.
3. Full voltage.
4. Shall be non-reversing, reversing, or two-speed as shown or specified.
5. Lockoff provisions and neon pilot light where shown or required.
6. Starting switches labeled for function performed.
7. Square D Class 2510, 2511, 2512 Type K or equal by GE, or Allen-Bradley.

## 2.03 MAGNETIC STARTERS

A. General:

1. Size per NEMA and UL standard to match motor controlled. Exceptions: NEMA Size 1 minimum (except NEMA Size 0 may be used for ventilation equipment 2 HP and less and in a separate H&V control panel) or as shown otherwise.
2. Starter coil voltage shall be 120 VAC unless noted otherwise.
3. Provide auxiliary contacts as required.
4. Provide with melting alloy thermal overloads.

B. Full Voltage Non-Reversing Starting (FVNR):

1. Across-the-line type, rated 600 volts maximum.
2. Equipped with double break silver alloy contacts. (Single break shall be supplied on Size 8.)
3. Straight-through wiring.
4. Coils - Of molded construction through NEMA Size 7. Coils on Size 8 starters shall be form wound, taped, varnished and baked. Replaceable from the front without removing the starter from the panel.
5. Suitable for the addition of at least four auxiliary contacts.
6. Square D Class 8536, General Electric, Allen-Bradley, or equal.

## 2.04 COMBINATION MAGNETIC STARTERS

- A. Factory assembled of UL-listed components within a single enclosure containing MCP, magnetic starter, CPT, overloads, and pilot devices as called for.
- B. Handle mechanism permanently connected to switch (operating through approximately a 180-degree arc) and installed in body of enclosure with interlock to prevent unauthorized opening or closing of door with switch on.
- C. Provision for padlocking disconnect handle in off position.
- D. Disconnect handle having clear indication of switch(es) position.
- E. Auxiliary switches where indicated on Contract Drawings.
- F. Magnetic starter, auxiliary controls and motor circuit protector as specified.

## 2.05 MAGNETIC CONTACTORS

- A. General:
  - 1. Power and lighting contactors of the voltage, current rating, and number of poles as indicated on the Contract Drawings.
  - 2. Continuously rated for all types of ballast and tungsten lighting, resistive and motor loads.
  - 3. Totally enclosed, double break, silver-cadmium-oxide power type.
  - 4. Auxiliary arcing contacts are not acceptable.
  - 5. Auxiliary contacts and control circuit fusing as indicated on the Contract Drawings.
  - 6. Industrial duty rated for 600-volt operation.
- B. Electrically-Held Contactor Coils - Continuously rated and encapsulated.
- C. Mechanically-Held Contactors - Coil-clearing contacts supplied so that the contactor coil shall be energized only during the instance of operation. Both the latching and unlatching coils shall be encapsulated.
- D. Manufacturers:
  - 1. Mechanically Held Over 200 Amps - Square D Class 8903, ASCO Bulletin 911, or equal.
  - 2. Electrically Held Over 200 Amps - ASCO Bulletin 1035, Square D Class 8903 Type S, or equal.
  - 3. Mechanically Held 20-200 Amps - ASCO Bulletin 920, Square D Class 8903 Type S, or equal.
  - 4. Electrically Held 20-200 Amps - Square D Class 8903, ASCO Bulletin 1035, or equal.
  - 5. Multipole Lighting CONTRACTORs, 20 Amp - Square D Class 8903 Type L, ASCO Bulletin 917, or equal.

2.06 RELAYS (0-25 AMPS)

- A. See Section 16900.

2.07 INTRINSICALLY-SAFE BARRIERS

- A. See Section 16900.

PART 3 EXECUTION

3.01 GENERAL

- A. Install according to the requirements of the National Electric Code and as shown or noted on the Contract Documents.
- B. Mount all contactors in an enclosure as individual units or in a control panel as part of a control system.
- C. Enclosures and control panels to comply with Section 16161.

3.02 INDIVIDUAL RELAY OR CONTACTOR ENCLOSURES

- A. Wall mount unless noted or shown otherwise.
- B. Mounting Height - Approximately 60 inches to enclosure top from finished floor.
- C. NEMA enclosure for area of mounting, per Section 16161.

3.03 ENCLOSED STARTER MOUNTING

- A. Height - Per Section 16161.
- B. Mounting Methods and Material - Per Section 16191 and manufacturer's requirements.

END OF SECTION

SECTION 16486  
MOTOR CONTROL CENTERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Motor control centers.

1.02 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 01780 - RECORD DOCUMENTS.
- E. Section 01781 - OPERATION AND MAINTENANCE DATA.
- F. Section 16055 - ELECTRICAL WORK.
- G. Section 16191 - ELECTRICAL SUPPORTS, ANCHORS AND FASTENERS.
- H. Section 16475 - OVERCURRENT PROTECTIVE DEVICES.
- I. Section 16480 - VARIABLE FREQUENCY DRIVES.
- J. Section 16484 - CONTACTORS AND MOTOR STARTING EQUIPMENT.
- K. Section 16900 - AUXILIARY CONTROLS AND RELAYS.
- L. Section 16950 - TESTING AND INSPECTION.

1.03 REFERENCES

NFPA 70	National Electrical Code
UL 198C	High-Interrupting Capacity Fuses; Current Limiting Type
UL 198E	Class R Fuses
NEMA AB 1	Molded Case Circuit Breakers
NEMA ICS 2	Industrial Control Devices, Controllers, and Assemblies
NEMA ICS 2.3	Instructions for the Handling, Installation, Operation, and Maintenance of Motor Control Centers
NEMA ICS 2	Industrial Control Devices Controllers and Assemblies
ANSI 255.1	

1.04 SUBMITTALS

- A. Submit under provisions of Sections 01331 and 16055.

- B. Shop Drawings - Include front and side views of enclosures with overall dimensions shown; conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, short circuit bracing, neutral, and ground; electrical characteristics including voltage, frame size and trip ratings, withstand ratings, and time/current curves of all equipment and components; factory elementaries for each compartment; motor control centers structures; and motor control center layout diagrams.
- C. Samples shall be submitted as may be requested by the ENGINEER. Any samples requested will be returned.
- D. Test Reports - Indicate field test and inspection procedures and test results.
- E. The CONTRACTOR shall furnish a reproducible copy and four prints of the approved as-built wiring diagrams showing all wiring in the motor control center. See Section 16055 for final construction record drawing requirements.
- F. Manufacturer's Installation Instructions - Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Sections 01781 and 16055.
- B. Maintenance Data - Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended manufacturer maintenance procedures and intervals.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with NEMA ICS 2.3.

1.07 QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing the products specified in this Section with minimum 10 years' experience.

1.08 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70, Underwriters Laboratories Publication UL-845, and NEMA Publication ICS-2.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, provide protection, and handle products to and at the site under provisions of Sections 01640 and 16055.
- B. Deliver in 60-inch maximum width shipping splits, individually wrapped for protection, and mounted on shipping skids.
- C. 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.



- D. Handle in accordance with NEMA ICS 2.3. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to motor control center components, enclosure, and finish.
- E. MCC shall be internally braced to allow the shipping splits to be laid on their sides to move units through doors.

#### 1.10 ENVIRONMENTAL REQUIREMENTS

- A. Conform to NEMA ICS 2 service conditions during and after installation of motor control centers.

#### 1.11 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on shop drawings and the unit fits into the space shown on the Contract Drawings.
- B. Coordinate the locations and sizing of housekeeping pads. Pads shall be large enough to accommodate future sections.

#### 1.11 EXTRA MATERIALS

- A. Furnish under provisions of Sections 01780 and 16055.
- B. Provide the following materials, each tagged or conspicuously marked or labeled with the manufacturer's name, part number and name. All parts shall appear on a typed list showing the above plus quantity and location.
  - 1. One box (minimum 10) of each size control power fuses furnished.
  - 2. One set of starter contacts for every two starters or fraction thereof of each NEMA size installed.
  - 3. One starter coil for every five NEMA size starters installed. (All starters are full sized NEMA.)
  - 4. One control power transformer (CPT) for each size installed.
  - 5. Indicating Pilot Lights, LED Type - 12 red, 12 amber, 2 green, 2 blue, and 2 white.
  - 6. Two control relays, timing relays and motor timing relays of each type used.
  - 7. Six sets of control relay contacts.
  - 8. Six sets of each N.O. and N.C. starter auxiliary contacts for each size starter provided.
  - 9. Two NEMA Size 1 starters.
  - 10. One 3-amp frame MCP.
  - 11. One 15-amp frame MCP.
  - 12. Lamp replacer tool.
  - 13. One fuse puller for each MCC, new or modified.
  - 14. 36-inch wide, 1/4-inch thick corrugated switchboard matting. A total length of 36 lineal feet shall be provided. Matting will be installed in front of all new and existing interior electrical equipment as designated by the ENGINEER. Shall comply with ANSI/ASTM D178 J6-7 Type 2, Class 2 specifications. Available Lab Safety Supply (1-800-356-0783).
  - 15. One metal storage cabinet 36 inches wide by 20 inches deep by 78 inches high with doors. Cabinet shall be welded, 12 gauge steel construction, three-point locking mechanism, with four fully adjustable shelves. Grainger Stock No. 5ZH07, Stronghold Model 36-204, or equal.
  - 16. One hand-held thermograph with laser sighting option, by Exergen Corp., Flir Equipment Co. or equal.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Schneider Electric (Square D) - Model 6 (design basis).
- B. No substitutions.

### 2.02 GENERAL

- A. Provide motor control centers as shown on the Contract Drawings.
- B. Motor Control Centers - NEMA ICS 2, Class II, Type B wiring with terminal blocks mounted on lift out brackets in the units. Coordinate wire color coding with Section 16055.
- C. Terminals - Accept all control and power wiring as shown
- D. Main Overcurrent Protection - Molded case switches or circuit breakers as shown on the Drawings.
- E. Branch Breakers - Molded case thermal-magnetic circuit breakers.
- F. Voltage Rating - 480 volts, three phase, four wire, 60 Hertz.
- G. Horizontal Bus - Silver-plated copper with a continuous current rating as shown on the Contract Drawings. Include copper ground bus entire length of control center and a fully rated neutral.
- H. Vertical Bus - Copper with a minimum continuous current rating of 300 amperes minimum or larger as required for the loads or as shown on the Contract Drawings, running the full working height (unless otherwise shown) of the section with bolted connections to horizontal bus. Also increase vertical bus rating where shown on the Drawings.
- I. Integrated Equipment Short Circuit Rating - 65,000 amperes rms symmetrical at 480 volts.
- J. Configuration - Units front mounting only, accessible from the front only.
- K. Enclosure - NEMA ICS 6, Type 1A gasketed.
- L. Dimensions - Nominal
  - 1. Depth - 20 inches.
  - 2. Vertical Sections - 6 space factors (72 inches) of unit mounting space.
  - 3. Overall Height - 90 inches.
- M. Finish
  - 1. Manufacturer's standard gray enamel.
  - 2. Factory finish process with cleaning, rinsing, phosphating, four pre-paint rinses, three post paint rinses, a bake cure, and cool down for each section.
- N. Section Wireways
  - 1. Two horizontal and one vertical wireway, the full width and working height of each section.
  - 2. Provide barrier plates, cable supports reusable wire ties, and captive screws.
  - 3. For openings or cutouts in wireways, provide rubber grommet-type protectors around openings.
- O. Material
  - 1. Exterior Frame - Fabricated from copper bearing reinforced steel plate construction.
  - 2. Bus Supports - High strength glass reinforced alkyd material.

- P. Bus Barriers
  - 1. Permit unit plug-on contacts to pass through and engage the vertical bus bars.
  - 2. Provide bottom bus covers below the vertical bus.
  - 3. Unused Plug-On Openings - Provide plastic closing plates.
- Q. Plug-On Connections
  - 1. Two-point connection to tighten around the vertical bus bar.
  - 2. Material - Silver plated.
  - 3. Cable Connections to the Plug-On Connections - Welded type.
- R. Bucket Alignment - Guide rails within the structure for horizontal and vertical alignment.

## 2.03 AUTOMATIC CONTROLLERS

- A. Magnetic Motor Controllers - NEMA ICS 2, AC general-purpose Class A magnetic controller for induction motors rated in horsepower. Minimum NEMA Size 1.
- B. Coil Operating Voltage - 120 volts, 60 Hertz.
- C. Overload Relay - NEMA ICS; melting alloy.
- D. Variable frequency drives and harmonic mitigation equipment installed in the MCCs shall be in accordance with Section 16480.

## 2.04 PRODUCT OPTIONS AND FEATURES

- A. Auxiliary Contacts - NEMA ICS 2, two each normally open/closed contacts in addition to seal-in contact.
- B. Door-Mounted Pilot Devices - NEMA ICS 2, heavy duty type. See Section 16900.
- C. Refer to Section 16900 for pushbuttons, indicating lights, selector switches, relays, and control power transformers.
- D. Metering
  - 1. Provide digital power metering on the load side of MCC-RA incoming feeder breakers. Schneider Electric PM820 with MC8ECC Ethernet module.
  - 2. Meters shall monitor current, voltage, power, and energy simultaneously.
  - 3. Provide individual harmonic measurements on current and voltage.
  - 4. Provide total harmonic distortion (THD) measurement.
  - 5. Provide Modbus TCP/IP communications for remote monitoring by the plant control system.
    - a. RJ-45 connection integral to the digital power meter for communications.
    - b. Shall communicate directly to the supervisory software driver for display and historization in the SCADA program.

## 2.05 DISCONNECTS

- A. Combination Controllers - Combine motor controllers with thermal magnetic circuit breakers or motor circuit protector as scheduled. Provide means for locking disconnect handle and means for defeating cover interlock.
- B. Thermal-Magnetic Circuit Breakers - NEMA AB 1, with integral thermal and instantaneous magnetic trip in each pole.
- C. Motor Circuit Protector - NEMA AB 1, circuit breakers with integral instantaneous magnetic trip in each pole.

- D. Disconnect Operator - All circuit disconnecting means shall be handle operated through approximately a 180 degree arc to open or close the device. Operation shall be done vertically; horizontal or rotary operators are not acceptable. With labeled and color coded "On," "Off," and "Tripped" position indicators. Provide means of locking disconnect in the "Off" position.
- E. Maximum height from floor to top of any disconnecting means shall be no higher than 6 feet 6 inches above the floor with the MCC on the housekeeping pad as shown. CONTRACTOR may use permanently attached "drop handles" to meet this requirement.
- F. Fuses – In conformance with Section 16475.

## 2.06 INTEGRATED SURGE PROTECTIVE DEVICE (TVSS)

### A. General

- 1. The surge protective device (SPD) shall be a modular parallel transient voltage surge suppressor (TVSS), consisting of multistage metal oxide varistor suppression circuits.
- 2. Minimum surge current capacity shall be 160kA per phase and 80kA per mode.
- 3. The UL 1449 clamping voltage ratings shall not exceed the following:

VOLTAGE	L-N	L-G	N-G	L-L
480/277 VAC, 3 phase, 4 wire	800 V	800 V	700 V	1200 V

- 4. SPD shall be designed to withstand a maximum continuous operating voltage (MCOV) of not less than 115 percent of nominal RMS voltage.
- 5. Pulse Life Test - Capable of protecting against and surviving 5000 ANSI/IEEE C62.41 Category C3 transients without failure or degradation of UL 1449 suppression voltage ratings by more than 10 percent.
- 6. Surge suppressor shall be provided with the following features:
  - a. Individually fused suppression modes.
  - b. Thermal cutout.
  - c. Solid state bidirectional.
  - d. Front panel alarm with test/silence switch.
  - e. LED indicators to indicate loss of protection of fully operational circuit.
  - f. AC tracking filter with EMI/RFI filtering up to -50db from 100kHz to 100 MHz.
  - g. Surge counter.
  - h. Dry contacts for remote monitoring of alarm status.
- 7. SPD shall have a response time no greater than one nanosecond for any of the individual protection modes.
- 8. Provide NEMA 12 enclosures for the fused safety switch and the TVSS unit, unless integrated units are shown on the Contract Drawings.

### B. Integrated Surge Protection Units

- 1. Integrated TVSS equipment shall be suitable for mounting in equipment manufacturer's motor control center where shown on the Contract Drawings. The TVSS equipment shall be factory installed and connected.
- 2. Surge protection units shall be high energy parallel design for IEEE C62.41 Category C applications.
- 3. TVSS units shall be provided by the equipment manufacturer and factory installed and wired. Manufacturer shall custom mount each unit as required to achieve peak performance of the surge protective device. Front panel alarm information shall be accessible without opening the MCC compartment.
- 4. Surge protective units shall be provided with an integrated fused safety switch provided in the motor control center bucket.
- 5. Refer to individual equipment specifications for additional requirements.

- C. Manufacturers - Integral TVSS equipment shall be the product of the MCC manufacturer.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify conditions in accordance with Section 16055.
- B. Verify that surface is suitable for motor control center installation.
- C. The manufacturer of this equipment will be permitted to arrange his equipment to the best advantage and will be required to furnish at least the spare compartments as noted on the Drawings.

### 3.02 PREPARATION

- A. CONTRACTOR shall coordinate the size and location of housekeeping pads with the electrical equipment shop drawings.
- B. Housekeeping pads are detailed on the Contract Drawings.

### 3.03 INSTALLATION

- A. The motor control centers 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 review the method of installation for the motor control centers with the motor control centers manufacturer.
- C. 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.
- D. A manufacturer's representative shall supervise, check or assist in the installation of the motor control centers as required by Section 01620.
- E. Tighten accessible bus connections and mechanical fasteners after placing motor control center. Provide written certification that this was done.
- F. Select and install overload elements in motor starters to match installed motor characteristics.
- G. Provide engraved plastic nameplates under the provisions of Section 16055.
- H. Motor Data - Provide neatly typed label inside each motor starter door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.
- I. Wiring Diagrams - Approved final elementary diagram shall be glued inside each compartment door housing a motor controller, relay, or similar equipment. Other compartments shall also have approved final unit wiring diagrams glued on the inside face of door as well as a heater selection table.
- J. Motor control centers shall be mounted on raised concrete bases (housekeeping pads) unless noted otherwise. Bases are provided under provisions of Section 03001. Connections to external equipment and connections of the incoming services shall be as shown or as required by the equipment manufacturer.

### 3.04 FIELD QUALITY CONTROL

- A. Field tests shall be conducted on the motor control centers 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, together with the provisions of Section 16950.
- C. Deficiencies identified during field tests shall be corrected.
- D. All labor, equipment, 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.
- F. Field inspection and testing will be performed under the provisions of Sections 16055 and 16950.
- G. Inspect each controller to NEMA ICS 2.
- H. Correct any problems identified during field testing.

### 3.05 LABELING AND IDENTIFICATION

- A. All interior relays, timers or other control devices shall be labeled according to its designation on the elementary diagram.
- B. A control center identification nameplate with factory identification numbers and characteristics shall be fastened within every section. Each control center compartment (bucket) shall have its own identification nameplate fastened to the unit saddle. These nameplates shall have suitable references to factory records for efficient communication with supplier or manufacturer.

### 3.06 TESTING

- A. Prior to connection of any external feeder or load circuits, MCC breakers shall be electrically tested per Section 16950.
- B. Make all connections in accordance with the torquing specifications provided by the manufacturer.
- C. All power connections, breakers, and starters shall be given an infrared thermograph scan after the unit is operational and with each unit operating at as near full load as possible. See Section 16950. The CONTRACTOR shall prepare and submit written tabulation of the test results of each MCC compartment components.
- D. CONTRACTOR shall retorque or redo connections identified as potential problems.

- E. CONTRACTOR shall individually adjust all trip units for the specific requirements of each device.
- F. CONTRACTOR shall submit a letter of certification that all of the above have been done, are correct, and are fully operational.

END OF SECTION

## SECTION 16900

### AUXILIARY CONTROLS AND RELAYS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Pushbutton.
- B. Selector switches.
- C. Indicating pilot lights.
- D. Contact blocks.
- E. Control power transformers.
- F. Fuse blocks.
- G. Limit switches.
- H. Time delay relays.
- I. Relays.
- J. Intrinsically safe barriers.
- K. Liquid level sensors (floats).
- L. Uninterruptible power supplies.

##### 1.02 RELATED SECTIONS

- A. Section 01331 - SHOP DRAWING PROCEDURES.
- B. Section 01620 - EQUIPMENT - GENERAL.
- C. Section 01780 - RECORD DOCUMENTS.
- D. Section 01781 - OPERATION AND MAINTENANCE DATA.
- E. Section 16161 - CONTROL PANELS AND ENCLOSURES.
- F. Section 16486 - MOTOR CONTROL CENTERS.

##### 1.03 REFERENCES

NEMA ICS 1	General Standards for Industrial Control Systems
NEMA ICS 2	Standards for Industrial Control Devices, Controllers and Assemblies
NEMA ICS 6	Enclosures for Industrial Controls and Systems
NEMA ST 1	Standard for Specialty Transformers (Except General Purpose Type)



#### 1.04 SUBMITTALS

- A. Submit shop drawings under provisions of Sections 01331 and 16055.
- B. Submit shop drawings to NEMA ICS 1 indicating control panel layouts, wiring connections and diagrams, dimensions, support points.
- C. Submit product data under provisions of Sections 01331 and 16055.
- D. Submit product data for each component specified. The submittal shall be included as part of the system in which the component is specified.
- E. Submit manufacturer's installation instructions under provisions of Sections 01331 and 16055.
- F. Submit samples as requested by the ENGINEER.

#### 1.05 PROJECT RECORD DOCUMENTS

- A. Submit record documents under provisions of Sections 01780 and 16055.
- B. Accurately record actual locations of control equipment. Revise diagrams included in Drawings to reflect actual control device connections.

#### 1.06 OPERATION AND MAINTENANCE DATA

- A. Submit operation data under provisions of Section 01781.
- B. Include instructions for adjusting and resetting time delay relays, timers, and counters.
- C. Submit maintenance data under provisions of Section 01781.
- D. Include recommended preventive maintenance procedures and materials.

### PART 2 PRODUCTS

#### 2.01 PILOT DEVICES

- A. General:
  - 1. Pilot devices shall include indicating light, pushbuttons, and selector switches.
  - 2. Heavy-duty, industrial type, construction.
  - 3. Area Classification
    - a. Non-Classified Area Device Rating - NEMA 13 oil-tight.
    - b. Wet Area or Exterior Device Rating - NEMA 4 and NEMA 13 oil-tight and watertight.
    - c. Corrosive Area Device Rating - NEMA 4X, non-metallic.
  - 4. Provide extra large nameplates for all door or enclosure front-mounted devices.
  - 5. Controls and relays shall be by one manufacturer wherever possible.
  - 6. Provide enclosure for field mounted devices and individual controls in accordance with Section 16161.
  - 7. 22-millimeter diameter.
  - 8. Retaining ring and boot type.
- B. Pushbuttons and Selector Switches (PB) and (SEL SW):
  - 1. Lockout feature as indicated.
  - 2. Color - Red for stop or terminate function; black for all others.

3. Operators:
    - a. Provide “gloved hand” knobs for selector switches.
    - b. Provide “mushroom head” button on emergency stop pushbuttons.
  4. Stackable contact blocks.
  5. Devices shall be either momentary, maintained, spring return, push-pull, or other operational types as shown or otherwise specified.
  6. Manufacturer NEMA 4 and 13 Oil and Water Tight - General Electric, Square D Type K, or equal.
  7. Manufacturer NEMA 4X, Non-Metallic - Allen Bradley Type 800H, Square D Type SK, or equal.
- C. Indicating Pilot Lights (IL):
1. Glass or plastic lens.
  2. 120-volt LED transformer type.
  3. Push-to-test type.
  4. Lens color shall be as follows:

FUNCTION	COLOR
Motor running	Red
Malfunction	Amber
Ready	White or Green

5. Manufacturers - General Electric, Square D, Allen-Bradley, or equal.

## 2.02 CONTACT BLOCKS

- A. Molded of an amorphous transparent polyamid material with high impact resistance and resistant to carbon tracking.
- B. Contacts - Double break silver type rated at 10 amp at 120 VAC continuous.

## 2.03 CONTROL POWER TRANSFORMER (CPT)

- A. Standard industrial control type, VA size as required for the powered load.
- B. Dual voltage primary, with 120V ac, single phase secondary. All primary connections fused; size as required for the transformer.
- C. Secondary control fuse with capacity for the control circuit indicated.
- D. Can be DIN rail-mounted type in control panels.
- E. Manufacturer - Square D, General Electric, or equal.

## 2.04 FUSE BLOCKS

- A. General purpose Class H, K, and R phenolic fuse block for dual-element cartridge fuses.
- B. Can be DIN rail-mounted in control panels.
- C. Manufacturer – Buchanan, Siemens, or equal.

## 2.05 LIMIT SWITCHES (LS)

- A. Contacts - Silver-to-silver snap-acting where practicable and in all cases where the motion is slow.
- B. Switches - Operated by levers, plungers, or pushrods, depending on the application.
- C. Rollers - Provided where excessive wear due to a sliding action would result.
- D. Manufacturer - General Electric Class CR215G, Square D Class 9007 Type C, or equal.

## 2.06 TIME DELAY RELAYS (TR)

- A. Solid-state type with calibrated dial head or dipswitch adjustment, encapsulated coil, snap-action switch assembly of number of poles indicated.
- B. "On-Delay," "Off-Delay," or "On-Off Delay" dual head type as indicated; timing range intervals as shown or specified.
- C. Bases shall have captive screws for locking fork solderless connectors, single tier design, with relay retainer clips.
- D. Dust-tight construction.
- E. Provide auxiliary contacts where indicated.
- F. Contacts rated 10 amps resistive at 120 VAC.
- G. Manufacturer - Diversified Electronics Series "TD;" Square D, Type JCK; Timemark 300 Series, or equal.

## 2.07 GENERAL PURPOSE CONTROL RELAYS (CR)

- A. Units shall be plug-in type.
- B. Use - Shall be used in motor control centers and control panels.
- C. Number of poles and arrangement as shown or specified.
- D. Contacts
  - 1. Shall be rated 10 amps at 240 volts AC.
  - 2. Material shall be silver cadmium oxide.
- E. Coils shall be rated continuous duty.
- F. Sockets
  - 1. Supply with relay retainer clip.
  - 2. Terminal connections with captive screw to accept locking fork solderless connectors.
  - 3. Single tier design.
- G. Manufacturers - Square D Company Class 8501 Type K relay and Type NR socket; Potter-Brumfield; or equal.

## 2.08 INTRINSICALLY-SAFE BARRIERS

- A. Power supply, bistable input amplifier, intrinsically-safe for connections to passive devices located in hazardous areas.

- B. Relay Output Stage - LED indicator type.
- C. FM approved. Manufacturers: Pepperi & Fuchs WE Series, Square D Class 8501, or equal.

#### 2.09 LIQUID LEVEL SENSORS (FLOATS)

- A. Contacts - A normally open, normally closed mechanical micro switch SPDT (single break) totally encapsulated in epoxy or polyurethane. Mercury switches are not acceptable.
- B. Cable - Type STO or SJO cable of sufficient length to reach the first junction box with minimum conductor size of 19 AWG.
- C. Sufficient excess cable shall be provided with each liquid level sensor to adjust its vertical position 1 foot $\pm$  of its original setting.
- D. Provide stainless steel mounting brackets to support all float switches.
- E. Manufacturer - Flygt Model ENM-10 or equal.

#### 2.10 UNINTERRUPTIBLE POWER SUPPLY (UPS)

- A. See Division 17 specifications.

### PART 3 EXECUTION

#### 3.01 GENERAL

- A. Mount all individual controls in a suitable enclosure as specified per Sections 16161 or 16486.
- B. Identify all auxiliary controls per Sections 16055.
- C. General purpose control relays shall be used in motor control centers and manufactured or custom-built control panels.

#### 3.02 CONTROL POWER TRANSFORMER

- A. Provide individual control power transformers for each control circuit.
- B. Size as required by control circuit.

#### 3.03 FUSE BLOCKS

- A. Size as indicated on Drawings or as required.

#### 3.04 LIMIT SWITCHES

- A. Limit switches shall be provided where specified and where it is required to convert a mechanical motion into the control of an electric circuit.

#### 3.05 PUSHBUTTONS AND SELECTOR SWITCHES

- A. Units shall be back-mounted wherever possible.

### 3.06 FLOATS

- A. Mount floats per the installation notes or details as shown on the Drawings.

END OF SECTION

## SECTION 16950

### TESTING AND INSPECTION

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Electrical power distribution and control circuit testing.

##### 1.02 RELATED SECTIONS

- A. Section 01100 - SUMMARY OF WORK.
- B. Section 01331 - SHOP DRAWING PROCEDURES.
- C. Section 01620 - EQUIPMENT - GENERAL.
- D. Section 01780 - RECORD DOCUMENTS.
- E. Section 16055 - ELECTRICAL WORK.

##### 1.03 SUBMITTALS

- A. Made in accordance with Sections 01331 and 16055 and as specified herein.
- B. Submit test records and reports for all testing.

##### 1.04 CERTIFICATION OF TESTING

- A. Perform all tests in the presence of a duly authorized representative of the OWNER unless waived in writing by the ENGINEER. When the presence of such representative is so waived, certified results of the tests made and the results thereof shall be furnished by the CONTRACTOR.
- B. Perform all tests in the presence of the ENGINEER. Give the ENGINEER written notice of all tests at least two weeks in advance.

##### 1.05 TEST EQUIPMENT

- A. Furnish all instruments and a qualified engineer to properly perform all tests required.

##### 1.06 FACTORY-TRAINED SUPERVISION

- A. Provide necessary factory trained supervision to check over equipment for proper functioning before putting the equipment into operation as may be required by these specifications. This shall include establishing a simulated fault on checking out the coordination of the protective devices.
- B. Make necessary adjustments and testing in cooperation with the respective manufacturers and other CONTRACTORS when necessary. Perform all tests in accordance with the latest standards of the ANSI, IPCEA, IEEE and NEMA.

##### 1.07 COSTS

- A. Costs of all tests shall be borne by the CONTRACTOR and shall be included in the contract price.

1.08 DAMAGES

- A. If damage is indicated or observed during testing or from the review of tabulated data, replace defective or damaged materials and retest at no cost to the OWNER.

PART 2 MATERIALS

2.01 TESTING EQUIPMENT

- A. Furnish all test equipment required to correctly perform the system tests.

2.02 SPECIAL EQUIPMENT REQUIREMENTS

- A. 500-volt dc Megger - For maximum 300-volt systems, use battery operated crank only.
- B. 1,000-volt dc Megger - For maximum 600-volt systems, use battery operated crank only.

PART 3 EXECUTION

3.01 GENERAL

- A. After completion of the work, thoroughly test the entire electrical system, including electrical work required for instrumentation, control and power, and adjust electrical system as required.
- B. Test all electrical circuits to insure circuit continuity, insulation resistance, proper splicing, and freedom from improper grounds.
- C. System performance test runs are required. Coordinate test runs of electrical systems with test runs of equipment served thereby (i.e., mechanical, heating, air conditioning, process systems and plumbing).

3.02 GENERAL TESTING METHODS

- A. Panels - Test each panel with mains disconnected from the feeder, branches connected, branch circuit breakers closed, all fixtures in place and permanently connected, lamps removed or omitted from the sockets, and all wall switches closed.
- B. Feeders - Test with the feeders disconnected from the panels.
- C. Individual Power Circuits - Test each individual power circuit at the panel or motor control center with the power equipment connected for proper operation.
- D. Transformers (Low Voltage) - Megohmmeter test all transformers in accordance with the manufacturer's recommendations.
- E. Lighting and receptacle circuits do not need to be megger tested.

3.03 EQUIPMENT TESTING (600 volts and below)

- A. Megohmmeter Tests
  - 1. Conduct megohmmeter tests of the insulation resistance of rotating machines and power distribution feeders down to panelboard feeders. The results will be accepted when the megger shows the insulation resistance to be not less than 50 megohms at 20 degrees C

using either a 500-volt or 1,000-volt megger. Wait 1 minute between each test for all conductors in the same enclosure and each conductor and ground.

2. Perform megohmmeter testing (Insulation Resistance Test) of all motor power and control wiring after the cables are in place and just prior to final terminations. Record all data as per Exhibit A. Lighting and receptacle panelboard branch circuits are not megohmmeter tested.

B. Voltage and Amperage Testing

1. Check all single and three phase motor amperage while the unit is running at as close to operating load as possible. Record voltage on each line and the amp draw for each leg. Provide results in a typed report format and submit as part of the CONTRACTOR's closeout package.
2. Check the load current in each phase of each distribution, lighting and receptacle panelboard feeder and make modifications to the circuit loading to correct load unbalance to within 1 kVA phase to phase for each panelboard.

3.04 GROUNDING SYSTEM

- A. Test the grounding system to verify a resistance to ground of 5 ohms or less via the "fall of potential" method. If the resistance is greater than 5 ohms, modifications shall be made to the system by adding additional ground rods or plates to bring the resistance test value to 5 ohms or less. Perform test a minimum of 90 days after the installation of the ground rods. Submit a record/report to the ENGINEER. Include the following:
1. Time, date, temperature, frost information depth (if applicable), and weather conditions.
  2. Location of ground grid under test.
  3. Date of ground grid installation.
  4. Driven depth of electrodes.
  5. Moisture content of earth at time of measurement (wet, dry, etc.).
  6. Ground test equipment, model numbers, and last date of calibration.
  7. Detailed description of method used.
  8. Plot of "distance from ground grid versus resistance." Distance of farthest probe is 100 feet, with the movable probe recording at 10-foot increments moving from farthest probe back to ground rod under test. Test each outside ground rod. Resistances shall range from 0-50 ohms with enough points to produce a smooth curve.
  9. Maintenance information and recommendations (if applicable).
- B. Test all grounding conductors and grounding systems for continuity. Where continuity does not exist, conditions will be corrected by an approved method and the system retested.

3.05 SYSTEM LOAD BALANCING

- A. Check the load current in each phase of each distribution panel feeder and make modifications to the circuit loading to correct load unbalance to within 1 kVA phase to phase for distribution panels.

3.06 SYSTEM CHECKS

- A. Preliminary
1. Connect all motors to protective devices and controls to give proper motor acceleration and correct motor rotation. Interconnect the control wiring to all the control devices associated with a machine, a group of machines, or other device to produce the correct operation, timing, and/or sequencing of the equipment.
  2. Adjust overload elements in motor starters and check for coordination with the actual installed motor characteristics. Replace any overload element that is inadequate.
  3. Check all motor nameplates for verification of proper voltage, horsepower, speed, phase, and power factor.



- B. Operational
1. Then give the equipment an operational test to determine that all components including motors, controls, protective and switching devices, and auxiliary associated equipment are in operable condition and can function as described and shown on relevant specifications, operating instructions, and drawings.
  2. Take motor current reading at full load or as close to full load as the driven machine will develop. If the ammeter reading is over the rated full load current or the proper current for the load at which the machine was operated, determine the reason for the discrepancy and take the necessary corrective action.
  3. Remove the cause of any motor operating above full load rating instead of increasing the overload relay trip rating.

### 3.07 CLOSEOUT PROCEDURES

- A. General - Sequence closeout procedures so that work will not be endangered or damaged, and so that every required performance will be fully tested and demonstrated. Closeout shall be as required herein.
- B. Final Operational Check - Make a check of each item in each system to determine that it is set for proper operation. With the ENGINEER present, operate each system in a test run of appropriate duration to demonstrate compliance with performance requirements. During the following test runs, make final corrections or adjustments of systems to refine and improve performances where possible, including noise and vibration reductions, elimination of hazards, better response of controls, signals and alarms, and similar system performance improvements. Provide testing or inspection devices to permit observation of actual system performances and shall demonstrate that controls and items requiring service or maintenance are accessible.
- C. Cleaning and Lubrication - After final performance test run of each electrical system, clean system both externally and internally, comply with manufacturer's instructions for lubrication of both power and hand operated equipment, and remove excess lubrication, touch up minor damage to factory-painted finishes and other painting specified as electrical work, and refinish work where damage is extensive.
- D. Operating Instructions - General operating instructions are required. In addition to specific training of the OWNER's operating personnel specified in the individual sections, and in addition to preparation of written operating instructions and compiled maintenance manuals specified elsewhere in these specifications, provide general operating instructions for each operational system and equipment item of electrical work, and coordinate instructions with instructions for mechanical work, and other equipment where associated with electrical systems or equipment.
- E. System Description and Operation
1. Perform in the presence of the OWNER, the OWNER's operating personnel and the ENGINEER.
  2. Describe each basic electrical system and explain identification system, displayed diagrams, signals, alarms and audio visual provisions.
  3. Describe interfaces with mechanical equipment, including interlocks, sequencing, startup, shutdown, emergency, safety, system failure, security, and similar provisions.
  4. In the presence of the OWNER's personnel, display and conduct a "thumb-through" explanation of maintenance manuals, record drawings, spare parts inventory, storage and extra materials, meter readings, and similar service items.
  5. The CONTRACTOR shall videotape these sessions and provide the OWNER with two DVD copies.

### 3.08 CONTINUED SYSTEM OPERATIONS SUPPORT

- A. Coordinate the OWNER's takeover of electrical systems with takeover of mechanical systems, including the provision of skilled electrical operating and maintenance personnel until the time the OWNER's personnel take over operation of entire mechanical and electrical plant. Respond promptly with continued consultation and services (beyond takeover date) on electrical systems, matching required continued services on associated mechanical systems and equipment until the end of the warranty period.

### 3.09 DOCUMENTATION PROCEDURE

- A. Signed commitments are required. The transfer of electrical systems to the OWNER for operation will not proceed until guarantees, warranties, performance certifications, maintenance agreements and similar commitments to be signed by CONTRACTOR and other entities have been executed and transmitted to and accepted by the ENGINEER for placement in the OWNER's records.

### 3.10 THERMOGRAPH INSPECTIONS

- A. Perform thermograph inspections on all service terminations, feeder terminations, major power splices, switchgear terminations, transformer terminations, MCC terminations, and motor terminations for motors 5 HP or larger. Testing on major power distribution equipment will be performed with the plant running at a minimum of 70 percent capacity or the highest load that can be operated. Testing on individual pieces of equipment will be performed while the unit is operational at rated load and has operated for at least 30 minutes for continuously operated equipment or near the end of a cycle for equipment that operates on/off. Loads should be a minimum of 40 percent of full load. Readings at overcurrent devices and starters will be for line and load; motors will be connections in motor terminal boxes; and for transformers, primary and secondary terminations. Provide a report of test results to the OWNER including indication of any actions taken to resolve abnormal readings. See Exhibit B at the end of this section. All thermographic tests shall be reported on this form.

(continued)

**EXHIBIT A**

**TESTING AND INSPECTION**

**ELECTRICAL INSULATION TEST RECORD  
INSULATION RESISTANCE TEST**

EQUIP. I.D. CKT/MARK NO.	TEST VOLTAGE	PHASE TO GND. MEG OHMS				PHASE TO PHASE MEG OHMS						DATE TESTED
		A	B	C	N	A-B	A-N	B-C	B-N	C-A	C-N	

TEST EQUIPMENT CONTROL NO. \_\_\_\_\_

REMARKS:

PERFORMED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

APPROVED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

Test ENGINEER

## EXHIBIT B

### TESTING AND INSPECTION THERMOGRAPHIC TERMINATION TEST

EQUIPMENT	AMBIENT <sup>(1)</sup>	LINE/PRIMARY			LOAD/SECONDARY			LOAD CONDITION (% OF FULL)	COMMENTS <sup>(2,3)</sup>
		1	2	3	1	2	3		

Thermograph Model \_\_\_\_\_

Date of Test \_\_\_\_\_ Conducted by \_\_\_\_\_

Outdoor Temperature \_\_\_\_\_ Room Temperature \_\_\_\_\_

OWNER/ENGINEER Witness \_\_\_\_\_

- (1) Ambient is the breaker case temperature, transformer winding temperature, or motor housing temperature. For bus or cabling, it shall be the temperature of the bus or cable a minimum of 24 inches from the splice or termination.

(2)

TEMPERATURE DIFFERENCE	CONDITION	ACTION
1°C to 3°C	Possible deficiency	Investigate, i.e., clean terminations/retorque
4°C to 15°C	Deficiency	Determine problem and repair; retest
16°C and above	Major deficiency	Immediate shutdown; determine problem and repair and retest

- (3) Indicate any discrepancies the cause of any temperature differences and indicate action to be taken.

#### Test Parameters:

- Imaging equipment shall be capable of detecting a minimum temperature difference of 1 degree at 30 degrees C.
- Equipment shall detect and convert emitted radiation to a visual signal.
- Tests to be run during periods of maximum possible loading, but at least 40 percent of rated load.

END OF SECTION

SECTION 17000  
INSTRUMENTATION

PART 1     GENERAL

1.01     SECTION INCLUDES

- A.       This section includes the general work description and requirements for instrumentation provided by this contract.

1.02     GENERAL REQUIREMENTS

- A.       It is a requirement of this specification that all Division 17 specifications be provided by a single supplier. This supplier shall have total responsibility for the entire system performance and compatibility of this Section, as well as all other Division 17 specifications.

1.03     RELATED SECTIONS

The specifications sections listed below are an integral part of this equipment specification and the CONTRACTOR shall be responsible for providing these sections to the equipment suppliers:

- A.       Section 01331 - SHOP DRAWING PROCEDURES.
- B.       Section 01630 - SUBSTITUTIONS.
- C.       Section 01640 - TRANSPORTATION AND HANDLING OF MATERIALS AND EQUIPMENT.
- D.       Section 01660 - STORAGE OF MATERIAL.
- E.       Section 16055 - ELECTRICAL WORK.
- F.       All Division 17 Specifications.

1.04     REFERENCES

- A.       NEMA ICS 1 - General Standards for Industrial Control and Systems.
- B.       NEMA ICS 3 - Industrial Systems.
- C.       NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
- D.       NFPA 70 - National Electrical Code (NEC).
- E.       NFPA 79 - NEC (Labeling)
- F.       ISA - Standards 5.1 and 5.4.
- G.       IEC 1131-3 – Programming Standards.

## 1.05 SHOP DRAWINGS

- A. All Division 17 specifications shall be submitted in one shop drawing. Requirements of individual specification sections shall be contained within a single section in the shop drawing submittal. Indicate individual specification sections with a protruding tab. Submit material in the format and order as described in paragraph 1.05.B.3.
- B. Shop Drawing Submittal Format
1. Shop drawings shall be submitted electronically per Division 1 specifications.
  2. Shop drawings not containing the appropriate performance affidavit (where specified), date dependency affidavit(s), or format will be returned without further review.
- C. Shop Drawing Submittal Contents - The following requirements pertain to all of Division 17 specifications and are intended to complement the requirements of Sections 01331 and 01620. Refer to individual Division 17 specifications for further requirements.
1. Performance affidavits where specified.
  2. Date Dependency affidavits for all equipment.
  3. Include a complete Table of Conformance to each paragraph, or part, of Part II in the respective specification. Use a Microsoft Word table format with four columns labeled as "Specification Section", "Equipment Manufacturer", "Equipment Model", "Compliant (Y/N). If No, specify". As a minimum, identify equipment compliance in the "Compliant (Y/N). If No, specify" column for each article (i.e. 2.02), letter heading (i.e. A, B, C), and each number heading (i.e. 1, 2, 3). For exceptions or deviations, include a narrative description as to how the deviation or exception can benefit the system over that which is specified.
  4. Training Itinerary – Detailed itinerary for the training to be provided in Microsoft Word table format. Itemize the day of training ("Day 1", "Day 2", or "Hour 1", "Hour 2", etc.) and the lessons to be taught during that period. Further discuss the equipment to be used during training and the proposed location of training for that day. Account for all days of specified training. Provide one training itinerary sheet for each training period. At the top of each sheet provide a header description of the training session and duration of training to be provided.
  5. Detailed Bill of Materials in Microsoft Word table format, or Excel, identifying component name, manufacturer, model number, and quantity supplied. Typical Bills of Materials are not acceptable.
  6. Descriptive lists of spare parts and extra materials provided in the same tabular format as the Bill of Materials. Lists shall be exclusive to the spare parts and extra materials requested by the specification section, hence separate from the Bill of Materials for installed equipment. Lists shall be intuitive and specifically created for this project.
  7. For individual equipment, submit information satisfying every item discussed in Part II of that specification section. Additionally, submit on all supporting accessories including, but not limited to, terminal blocks, surge and lightning suppression, UPSs, fuses, and cabling.
  8. AutoCAD drawings - Provide loop and block diagrams. Symbols used and nomenclature shall be in accordance to ISA Standard 5.4. Diagrams shall be specific to the equipment submitted with the options and features specified or otherwise provided. The inclusion of options not specified or provided is unacceptable. Terminal points depicted shall be the terminal points provided with identical terminal point designations as the supplied equipment. Illustrate all available terminals that are not utilized.
  9. Proposed nameplate wording. Scaled illustrations for each nameplate provided.
  10. Manufacturer's literature and Web site printouts are independent of the above requests for information and, hence do not satisfy the above shop drawing requirements. All catalog cuts, Web site printouts, manufacturer's specifications, and drawings shall be clearly marked to allow identification of the specific products used. **Cross-out all options and functions not supplied with the equipment.**

11. Electrical power requirements, connection requirements, interconnecting cabling, and environmental limitations/restrictions.
12. Dimensions and weights of the equipment with the specified options.

#### 1.06 OPERATION AND MAINTENANCE DATA

- A. The following requirements pertain to all of Division 17 specifications and are intended to complement the requirements of Sections 01620 and 01781 as well as individual Division 17 specifications.
- B. Submit under provisions of Sections 01620 and 01781.
- C. Provide complete sets of electronic operation and maintenance manuals. In addition to “As-Built” system drawings, the manuals shall include internal wiring diagrams and operating and maintenance literature for all components provided under Division 17. Binders shall not be larger than 3-inch.
- D. Utilize a Table of Contents listing major headings and sub-major headings. Provide protruding tabs labeled with the pertinent heading for each item listed in the Table of Contents. Tab labels shall be permanently fixed to semi-rigid section dividers. Otherwise, utilize the same format as specified for shop drawing submittals.
- E. Submitted literature shall be in sufficient detail to facilitate the operation, removal, installation, programming and configuration, adjustment, calibration, testing, and maintenance of each component and/or instrument. Indicate application conditions and limitations of use stipulated by the Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- F. Include the configuration settings for each instrument provided in Division 17. Provide a Table of Contents with protruding tabs for each instrument. Label each protruding tab with the equipment name and equipment designation. Indicate the value of all configuration parameters and setpoints, including those that are not utilized in the equipment’s field configuration.
- G. CONTRACTOR shall review all submitted literature and cross out all options, functions, warranties, etc. not part of the supplied equipment.

#### 1.07 PROJECT RECORD DOCUMENTS

- A. The following requirements pertain to all of Division 17 specifications and are intended to complement the requirements of Sections 01620 and 01781 as well as individual Division 17 specifications.
- B. Submit under provisions of Sections 01620, 01780, and 16055.
- C. Record actual locations of controller cabinets and input and output devices connected to system. Include interconnection wiring and cabling information, and terminal block layouts in controller cabinets.

#### 1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Sections 01640, 01660, and 16055.
- B. Accept products on site in factory containers unless system is completely integrated into a pre-manufactured panel that has been factory tested. Inspect for damage.

- C. Store products in clean, dry area; maintain temperature to NEMA ICS 1 requirements.
- D. All openings shall be made watertight before leaving the factory and shall remain watertight until equipment is ready for mounting. Equipment shall be inspected for the presence of such protection before equipment is removed from shipment vehicles. Equipment with any opening improperly made watertight shall be returned to the factory for a new replacement at no additional cost to the OWNER. Equipment stored onsite without any opening improperly made watertight shall also be returned to the factor for a new replacement at no additional cost to the OWNER.
- E. All factory applied protective films, to protect surfaces from scratches or soiling, shall remain in-place until the unit is mounted and commissioned.

#### 1.09 COORDINATION

- A. Refer to Contract Drawings for designations and verify with OWNER.
- B. Coordinate demonstration to OWNER with the CONTRACTOR and the OWNER.

#### 1.10 TRAINING

- A. CONTRACTOR shall video-record all training sessions. Provide a video recording of each training session on a single DVD. Provide two duplicate DVDs for each training session and distribute one copy to the OWNER and one to the ENGINEER. Provide computer-generated adhesive labels on each DVD. Label each DVD with the training session description, date training occurred, attendees, trainer, contact information, the equipment covered during the training session, and the project title.
- B. ENGINEER will review their copy for video quality including, but not limited to, picture quality, use of camera angles, and sound recording quality. Video must be clearly audible. If the ENGINEER deems the video or audio quality as poor, the CONTRACTOR shall conduct the training session again (with original attendees present) and re-record the session at no additional cost to the OWNER.
- C. Provide a DVD case to hold all training tapes provided for Division 17 specifications.

### PART 2 PRODUCTS

#### 2.01 ACCESSORIES

- A. Nameplates:
  1. Laminated plastic nameplates shall be provided for each instrument in Division 17.
  2. Nameplates shall have 5/16-inch high capital, white letters on black background machine engraved. Hang nameplates from process-mounted instruments via metallic chains. Nameplates shall be hung within 12 inches of the equipment.
  3. Final wording on nameplate shall be submitted during the shop drawing phase and approved by the engineer.
  4. Nameplates shall be uniformly mounted and of identical form-factor for all equipment that nameplates are provided. Once a nameplate format has been selected, the format shall be utilized for all equipment throughout, thereby excluding providing original equipment manufacturer nameplates.
  5. Where wire labeling is not conducive to nameplate tagging as specified above, such as in MCC compartments or inside the PLC enclosure, provide wire labeling on computer printed, adhesive tape and wrap around wiring. Printing that is capable of being rubbed off the wire label is not acceptable.



6. Text on nameplates shall be as follows.
  - a. First Line – Equipment name. Equipment name shall as listed on the Contract Drawings and PLC input/output (I/O) lists.
  - b. Second Line – Equipment designation. Designation shall be in accordance with ISA Standards 5.1 and 5.4 as listed in the PLC I/O lists and on the Contract Drawings.
  - c. Third Line – Wiring destination. Indicate the destination of the wiring (i.e. PLC-1, PLC-2, MCC-PI, etc.).
- B. Lightning and Surge Protection (TVSS):
  1. Provide lightning and surge protection on the power supply of each instrument provided under Division 17.
  2. Provide lightning and surge protection on all analog input and output signal circuits that pass out-of-doors or are terminated to metallic piping that passes out-of-doors.
  3. TVSS devices mounted on the analog output signal wiring of field-mounted transmitters shall be conduit-mounted utilizing a common chamber, three element, gas tube and clamp incoming transients to a level acceptable to the transmitter it is protecting. Manufacturer shall be Joslyn, Model 1669-01, or equal.
  4. TVSS devices protecting analog circuits entering the PLC enclosure shall be din-rail mounted with removable terminal blocks on each side of the device with no interruption of the incoming signal by unplugging the TVSS device. Device shall possess the capability of discharging 1,000 amps evaluated on an 8x20-microsecond waveform. Device shall have an LED to indicate the unit is functioning properly. TVSS device shall be manufactured by M-System Co, Model MDP-24-1, or equal.
- C. Wiring/Conduit/Mounting:
  1. The CONTRACTOR shall provide all power wiring and conduit to each instrument specified in Division 17.
  2. The CONTRACTOR shall provide all signal wiring and conduit from the Programmable Logic Controller to new, and existing, equipment as specified in the I/O list of Section 17100 and the Contract Documents.
  3. The CONTRACTOR shall provide all other wiring integral to supplied equipment to achieve the specified system performance as discussed individual Division 17 specification sections.
  4. The CONTRACTOR shall mount all equipment specified in Division 17 in locations discussed/shown in the Contract Documents.

## PART 3 EXECUTION

### 3.01 EQUIPMENT MOUNTING

- A. All mounted equipment shall have sufficient clearance from other provided or existing obstructions (including walls, pipes, conduit, or other instruments) to facilitate removal, adjustment, inspection, and calibration of the installed device. Any device that is mounted without sufficient clearance to perform these functions with standard, manufacturer recommended tools shall be removed and remounted at no additional cost to the OWNER.
- B. Rotate equipment heads as directed by the ENGINEER in the punch list for final completion.

END OF SECTION

## SECTION 17100

### PROGRAMMABLE LOGIC CONTROLLERS (PLC)

#### PART 1 GENERAL

##### 1.01 SCOPE

- A. OWNER's System Integrator shall provide the following services related to this Section as part of Bid Item 3 – Cash Allowance for PLC and SCADA System Work:
  - 1. PLC enclosures, complete with all necessary accessories and PLC programming software, wired to accommodate all inputs and outputs listed in the input/output (I/O) lists, ready to communicate via the specified medium(s), and ready to be programmed under Section 17101.
- B. OWNER's System Integrator is:

KAMAN Automation, Inc.  
245 Cooper Ave  
Tonawanda, NY 14150  
Telephone: (716) 206-0061
- C. The CONTRACTOR shall provide the following services related to this Section as part of the work under lump sum Bid Item 1 – General Construction:
  - 1. Installation of PLC control panels.
  - 2. Furnishing and installing conduit and wiring, Ethernet cables, fiber optic cables, fiber optic jumper cables.
  - 3. Providing field instruments as specified.
- D. The CONTRACTOR is responsible for coordinating all work with the OWNER's System Integrator.
- E. This section includes:
  - 1. Programmable logic controllers (PLC).
  - 2. PLC power equipment and accessories.
  - 3. Uninterruptible power supplies (UPS).
  - 4. Surge suppression.
  - 5. DC power supplies.
  - 6. PLC enclosures.
  - 7. PLC communication architecture.
  - 8. PLC I/O lists.

##### 1.02 GENERAL REQUIREMENTS

- A. It is a requirement of this specification that all Division 17 specifications be provided by a single supplier. This supplier shall have total responsibility for the entire system performance and compatibility of this Section, as well as all other Division 17 specifications.

##### 1.03 RELATED SECTIONS

The specifications sections listed below are an integral part of this equipment specification and the CONTRACTOR shall be responsible for providing these sections to the equipment suppliers:

- A. Section 01331 - SHOP DRAWING PROCEDURES.
- B. Section 01630 - SUBSTITUTIONS.

- C. Section 01620 - EQUIPMENT - GENERAL.
- D. Section 01640 - TRANSPORTATION AND HANDLING OF MATERIALS AND EQUIPMENT.
- E. Section 01660 - STORAGE OF MATERIAL.
- F. Section 01780 - RECORD DOCUMENTS.
- G. Section 01781 - OPERATION AND MAINTENANCE DATA.
- H. Section 16055 - ELECTRICAL WORK.
- I. Section 16161 - CONTROL PANELS AND ENCLOSURE.S
- J. Section 16191 - ELECTRICAL SUPPORTS, ANCHORS AND FASTENERS
- K. All Division 17 Specifications.

#### 1.04 REFERENCES

- A. NEMA ICS 1 - General Standards for Industrial Control and Systems.
- B. NEMA ICS 3 - Industrial Systems.
- C. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
- D. NFPA 70 - National Electrical Code.
- E. NFPA 79 - Labeling.
- F. Instrumentation Society of America (ISA) - Standards 5.1 and 5.4.
- G. Industry Electric Code (IEC) – Article 1131.3, Programming Standards.

#### 1.05 DEFINITIONS

- A. UPS – Uninterruptible power supply.
- B. Industrial Workstation – An HMI with an OS that typically serves as a node on a network and is typically a client node. Industrial workstations are panel-mounted and specifically suited for an industrial environment; otherwise, they are identical to “Personal Computers” (PCs).
- C. I/O List – Per Contract Drawings.

#### 1.06 SUBMITTALS

- A. Shop Drawings – Submit under provisions of Sections 01331 and 01620. The following submittal requirements are to complement the requirements and format set forth in Section 17000. The following submittal material shall be submitted for the ENGINEER’s review and approval prior to fabrication of any PLC assemblies. PLCs that are fabricated prior to the approval of these shop drawings are subject to alteration to conform with the approved shop drawings by the supplier at the supplier’s cost.
  - 1. Using AutoCAD 2008, or higher, provide these drawings for each PLC in the following order. Label all components with manufacturer and complete model numbers on the drawings. Typical drawings are not acceptable.

- a. Scaled enclosure layout drawings in 11-inch by 17-inch format, detailing locations of all components on the new subpanel in the existing Passavant enclosure. Drawing shall display layout of completed assemblies, including, but not limited to, PLC backplane, PLC I/O modules, empty slots, UPS, Ethernet switches, terminal blocks, installed spare equipment, power supplies, power line isolators, surge suppression, grounding lugs, wireway, disconnect switches, fuses, control relays, acceptable regions for conduit penetrations of both AC and DC wiring separately, and external power. Illustrate handles, hasps, hinges, and dimensions of exterior mounted devices. Identify equipment manufacturer and model numbers by placing a number next to the piece of equipment on the drawing and cross-referencing with the Bill of Materials. In addition to the Bill of Materials cross-reference labeling, label PLC I/O modules on the drawing with the manufacturers complete model numbers.
- b. Elementary diagram drawings in 11-inch by 17-inch format, detailing all enclosure electrical components including, but not limited to, power line isolators, surge suppression, UPS, power supplies, fuses, duplex receptacles, indicating lights, switches, and control relays. Diagrams shall include terminal point designations, line reference numbers, and wire numbers. All wires shall maintain the same wire number for the entire contiguous segment of wire. Diagrams shall illustrate all network cabling and DC and AC electrical distribution. Drawing shall illustrate all available instrument terminations, both used and unused, and be labeled with the manufacturer's terminal point label as will be found on the installed instrument. Provide a legend on this sheet for all symbols and general notes used on this sheet and on the PLC I/O module detail drawings. Illustrate source of 120 VAC power.
- c. Scaled PLC I/O module detail drawings, in 11-inch by 17-inch format, for each card installed in the PLC backplane. Detail the wiring of all terminations on the PLC I/O module including, wiring of all I/O points and power. Illustrate all terminations points for each signal including termination points for terminal blocks, relays, etc. Identify each wires color and wire number. Utilize NFPA 79 standards to illustrate termination points: to an MCC, to a device terminal, to a control panel terminal, to fused blocks, to surge suppressor blocks, etc. Label each point on PLC I/O modules with the PLCs physical address. Utilize NFPA 79 standards for illustration of wiring: internal to the PLC enclosure, outside the PLC panel, and integral to a device. Progression of I/O modules detail drawings shall be in the order of the orientation of the I/O modules in the PLC backplane (e.g., Slots 1 and 2 on sheet 7, Slots 3 and 4 on sheet 8, etc.). Not more than two card details shall be shown on any one drawing. Each I/O module shall be labeled with the installed rack and slot number. Illustrate installed spare I/O modules, but it is not necessary to detail slot filler cards. Each drawing title shall have the following format:
 

Line 1: PLC Name (e.g., "Blower Building, PLC-3")

Line 2: Module Type (e.g., "Discrete Inputs", "Combo Module: AI, AO, DI, DO", etc.)

Line 3: Installed Rack and Slot (e.g., "Rack 1, Slots 3 and 4")

Label all PLC I/O module termination points and I/O point description as shown on the PLC I/O lists. For I/O list points that lack certain information, create descriptions that are in accordance with ISA Standard 5.1. Each point description shall utilize the following format:

Line 1: Equipment Description (e.g., "RWP-1", "NaOCl Pump No.1", "Clearwell Level Transmitter", etc.)

Line 2: Signal Description (e.g., "Run Indication", "Flow Indication", etc.)

Line 3: Signal Functional Designation (e.g., "YI-XXXX", "FI-XXXX", where "XXXX" is the instrument loop number.)
- d. Include one AutoCAD drawing illustrating how this new PLC integrates into the existing SCADA system network architecture. Detail all Ethernet switches, fiber optic cabling, Category 5e cabling, SCADA nodes, printers, modems, PC Ethernet

cards, PLC CPUs, and all other details required to create a comprehensive SCADA network architecture diagram for record document purpose. Illustrate location of the detailed equipment in the appropriate buildings and rooms. Illustrate all communication ports of the equipment, as they will be found in the field, including spare and unused ports.

- e. Provide two copies of all the above specified AutoCAD \*.dwg files on DVD-ROM. Drawing files must be capable of being used by others and saved to the disk in \*.dwg format.
  2. Submit manufacturer information on all software.
  3. Calculations to substantiate sizing of each UPS. For each UPS, itemize all equipment drawing from the UPS and compare the respective current and power draws and to the manufacturer's rating of current draw for the specified amount of time.
- B. Operation and Maintenance Manual – Submit under provisions of Sections 01640 and 01781. The following submittal requirements are to complement the requirements and format set forth in Section 17000.
1. Maintenance, troubleshooting, and replacement of PLC cards, racks, CPU, EEPROM, and all associated equipment.
  2. All “as built” AutoCAD \*.dwg files on CD ROM and 11-inch by 17-inch printed hardcopies.
  3. Warranties – Provide the warranties for the PLC, cards, programming software, operator interface, and all other PLC enclosure equipment in a section entitled “Warranties.” Equipment covered, dates of expiration, contacts and procedures to exercise each warranty, and limitations of warranty shall be explicitly noted. All warranty papers shall be completely filled out by the CONTRACTOR with all necessary serial and model numbers.
- C. Project Record Documents – Submit under provisions of Sections 01640 and 01780. The following submittal requirements are to complement the requirements and format set forth in Section 17000.
1. Revise AutoCAD drawings of individual I/O cards to reflect all scaling. Coordinate with the PLC programmer for each points scaling.
  2. Update the Operation and Maintenance Manual AutoCAD, or higher, drawing hardcopies and CD-ROM with the “as built” drawings.
  3. Updated AutoCAD drawings to indicate any changes made during installation or startup of the equipment provided under this section.
  4. Updated Bill of Materials reflecting any changes in manufacturers, models, or quantities.
  5. Updated Bill of Materials for spare parts supplied.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Scheduling delivery of PLCs to the jobsite:
1. All PLCs shall be shipped to the project site a minimum of 60 days prior to substantial completion.
  2. UPSs associated with the PLCs shall be delivered to the project site within two weeks prior to shipment of the PLCs to site.
- B. CONTRACTOR is responsible for all costs associated with shipping.
- C. CONTRACTOR is responsible for preparing the assembled PLCs and associated equipment for shipping and shipping them to the project site.
- D. Deliver, store, protect and handle products to site under provisions of Sections 01620, 01640, 01660, and 16055.
1. Shipping to all locations for all equipment provided under this section shall utilize accelerometer or 3-axis dye packets to indicate whether acceleration or deceleration of

three times the force of gravity (3G) has been exceeded. If acceleration/deceleration has been exceeded, CONTRACTOR shall pay for disassembly, damage repair, and reassembly of the shipped units. If any damage is apparent from inspection at time of delivery, CONTRACTOR is responsible for all costs involved in disassembly, damage repair, reassembly, and additional shipping back to the manufacturer's facility if deemed necessary by ENGINEER. Accelerometers shall be dye packet devices and shall not be reusable or resettable.

- E. Accept products on site in factory containers unless system is completely integrated into a pre-manufactured panel that has been factory tested. Inspect for damage.
- F. Store products in clean, dry area; maintain temperature to NEMA ICS 1 requirements.

#### 1.08 MAINTENANCE SERVICE

- A. Furnish manufacturer's, or designated authorized representative's, service and maintenance for PLCs a minimum of two years from Date of Substantial Completion.
- B. Provide OWNER with a toll-free phone number for technical information and assistance on the PLC and system programming or reimburse OWNER for calls made due to system maintenance, debug, tuning, etc. requirement during the two-year warranty period.
- C. PLC Equipment Replacement During Construction – CONTRACTOR shall replace PLC components when directed to do so by the Programmer. CONTRACTOR shall provide all costs necessary to return components that are suspect of damage to the manufacturer for testing and are responsible for returning repaired modules and reinstalling in place of the temporary replacement module. When available, temporary replacement modules may be taken from uninstalled spare inventory. When the required temporary replacement modules are not available in the uninstalled spare inventory, CONTRACTOR shall obtain the necessary temporary replacement module(s) within 48 hours of directive by the Programmer.

#### 1.09 COORDINATION

- A. Coordinate the compatibility of the power supplies and PLC cards with the new instrumentation, existing systems, and equipment. Coordination shall include, but not be limited to:
  - 1. Power supplies provide powered equipment with adequate voltage and amperage according to the connecting equipment manufacturer's recommendations.
- B. Refer to Contract Drawings for designations and verify with OWNER.
- C. Coordinate PLC panel shop testing demonstration with the OWNER and ENGINEER. Request for demonstration date shall be in writing no less than two weeks in advance of the proposed date.
- D. Changes to the scope of work, labor and equipment specifications may be made in writing by the ENGINEER or OWNER. Change orders and credits will not be authorized for work performed via verbal authorization or as directed by parties other than the ENGINEER or OWNER.

#### 1.10 SPARE PARTS

- A. Provide the following uninstalled spare parts that are identical to and interchangeable with the original parts. Spare parts shall be furnished in clearly identified containers, protected in accordance with the manufacturer's requirements.
  - 1. One (1) spare CPU for each CPU type.
  - 2. One (1) spare memory battery for each PLC.

3. One (1) spare PLC power supply of each type used.
4. Two (2) of each type discrete input module.
5. Two (2) of each type discrete output module.
6. Two (2) of each type analog input module.
7. Two (2) of each type analog output module.
8. One (1) Modbus TCP Ethernet module.
9. One (1) spare 24 VDC power supply of each type used.
10. One (1) Transient Voltage Surge Suppression (TVSS) device as used to protect the incoming power to the PLC panel.
11. Five (5) of each type surge suppression device as used to protect incoming analog signals.
12. Five (5) of each type surge suppression device as used to protect incoming discrete signals.
13. Ten (10) spare bulbs for each type of light.
14. Twenty (20) spare fuses of each type used for each control panel. Each control panel shall receive 20 spare fuses for each type used. Provide fuses in labeled containers and mount in each control panel.

## PART 2 PRODUCTS

### 2.01 PLC MANUFACTURERS

- A. For all new PLCs provided on this project, provide Schneider Electric, Model M340. No substitutions shall be allowed.
- B. For all new micro-PLCs provided on this project, provide Schneider Electric M221. No substitutions shall be allowed.

### 2.02 PROGRAMMABLE LOGIC CONTROLLER

- A. General Description
  1. Programmable controller manufactured to NEMA ICS 3 with component circuit boards manufactured to NEMA ICS 2.
  2. Rack-mounted design. Modular.
  3. Provide all terminal blocks, wiring arms.
  4. Ability to program through an IBM compatible computer.
  5. Provide all power supplies, cabling, surge protection, I/O racks, extensions, and ladder logic program to accommodate required I/O and system control as specified in previous sections.
  6. Programmable with software by the same manufacturer in strict accordance with IEC 1131-3 standards.
- B. Configuration
  1. Processor Unit - Include processor, power supply, EEPROM memory, input/output modules, and special modules required to communicate with other PLCs and other equipment designated to communicate digitally with the PLCs.
- C. Input/Output Units
  1. PLC
    - a. All I/O modules for PLCs shall be of the same form-factor as the PLC CPU and shall plug into the PLC backplane (rack).
    - b. Use discrete I/O modules with a minimum of 8 and a maximum of 16 points each, 24VDC or 120VAC as required by I/O lists. Discrete outputs shall be isolated. All discrete input modules shall have the same number of points. All discrete output modules shall have the same number of points.



- c. Use analog I/O cards with a maximum of eight channels per card. Use voltage, current, or other analog arrangements as required by I/O lists. Analog I/O shall have minimum 12-bit resolution. All analog inputs and outputs shall be isolated. All analog modules shall have the same number of points. Analog modules shall be capable of registering under (3.5 to 3.7 mA) and over range (greater than 20 mA) conditions.
  - d. Combination I/O modules are not acceptable.
- 2. Installed Spare I/O - Provide the following installed spare I/O:
  - a. Provide a minimum of 16 discrete inputs at each PLC.
  - b. Provide a minimum of eight discrete outputs at each PLC.
  - c. Provide a minimum of eight analog inputs at each PLC.
  - d. Provide a minimum of eight analog outputs at each PLC.
  - e. Wire all installed spare points to terminal strips. These terminal blocks do not count toward installed spare terminal blocks.
  - f. Discrete outputs shall be isolated using an interposing relay. Provide relays for used and installed spare discrete outputs.
  - g. In PLC enclosures where signal isolators are used to isolate analog inputs or analog outputs, provide signal isolators for each installed spare analog I/O point.
- 3. Refer to I/O list for I/O points for each PLC enclosure.
  - a. All I/O shall be wired to terminal strips. Where relays, intrinsically safe barriers and/or surge protection for I/O are required, wiring shall be from the I/O module to the relay, barrier, or surge protector to the terminal strip.
  - b. Provide intrinsically safe barriers for I/O originating in hazardous areas as indicated on the Contract Drawings. Installation and separation of wiring shall be in full accordance with the latest revision of the NEC.
  - c. Provide surge protection in accordance with Section 17000. Surge protection shall be located on a separate DIN rail from the terminal strips.
  - d. Provide loop and external power supplies for all field devices that require such power.
  - e. Provide 24 VDC power for all discrete inputs and discrete outputs.

## 2.03 STRATEGIC WIRING OF I/O

- A. Wiring of I/O shall be planned such that the failure of any single PLC I/O module minimally affects an overall process. The following guidelines shall be adhered to:
  - 1. Control outputs for multiple pumps of similar purpose shall be distributed across separate PLC output modules.
  - 2. Where redundant monitoring is designed, such as redundant level transmitters, the signals shall be located on separate I/O modules.
  - 3. For system components that are distributed across multiple modules, the wiring location on the PLC I/O module shall be consistent for that signal across each of the I/O modules over which similar equipment is distributed. To illustrate, if Pump 1's run indication is wired to input 1 on module 5, then Pump 2 and Pump 3's run indication shall also be wired to input 1 on their respective input modules.
  - 4. It is understood that the above strategic I/O wiring requirements will result in the use of additional modules with installed spares that are not necessarily in contiguous ranges.
  - 5. Relocate I/O points as directed by the ENGINEER through the shop drawing reviews.

## 2.04 ENCLOSURE

- A. Provide a new subpanel for installation in an existing enclosure at the treatment plant. Subpanel shall be appropriately sized to accommodate all I/O modules, power supplies, communication equipment, etc. as specified within this Section, as necessary to perform the required functions, and as required to fit within the existing enclosure.
- B. CONTRACTOR shall inspect the site to assess space available for the replacement subpanel.



- C. Each enclosure shall have two ground busses, one for instrumentation cable shields and enclosure grounding and one for signal grounding.
- D. Provide grounding lugs for connection to the external grounding system. Connect subpanel ground to plant grounding system.
- E. Provide a Ground Fault Circuit Interruptor (GFCI), 15-amp duplex receptacle in each PLC enclosure. To be used as a service outlet with both outlets available.
- F. Provide a fluorescent light package in each enclosure. Florescent light shall utilize a manual light switch, terminal block, and non-yellowing PVC lens. Light shall not energize automatically when door is opened. Light shall be Hoffman, Model A-LF16MXX, or equal. Size light to span entire interior width of enclosure, less no more than 10-inches.
- G. Terminal Blocks:
  - 1. Terminal blocks shall be DIN-Rail mounted compression-screw type.
  - 2. Label via machine printed zack strips as supplied by the terminal block manufacturer. Zack strips shall be plastic labels specifically designed for the supplied terminal block. Zack strips shall be capable of being separated to label stand-alone terminal block, if necessary.
  - 3. Screwless terminal blocks are not acceptable.
  - 4. Provide installed spare terminal blocks to accommodate wiring of PLC I/O modules provided in empty slots. Of the remaining empty slots, estimate half will be 8-point analog cards and half will be 16-point discrete cards. Mount installed spare terminal blocks in a contiguous strip next to the utilized discrete input, output, analog input, or output strips.
  - 5. For discrete I/O, utilize single tier terminal blocks (Phoenix Contact, Model UK 5N, or equal). For analog I/O, utilize double tier terminal blocks with grounding foot (Phoenix Contact, Model SLKK 5, or equal).
- H. Fuse Blocks:
  - 1. Fuse blocks shall utilize slow or fast blow glass fuses as appropriate for the protected device.
  - 2. Fuse block shall have an LED that illuminates when the fuse has blown.
  - 3. Label via machine printed zack strips as supplied by the fuse block manufacturer. Zack strips shall be plastic labels specifically designed for the supplied fuse block. Zack strips shall be capable of being separated to label stand-alone fuse block, if necessary
  - 4. Provide installed spare fuse blocks to accommodate wiring of additional PLC I/O modules. Estimate as is done for terminal blocks.
  - 5. Fuse block manufacturer shall be Phoenix Contact, Model UK5-HESI, or equal.
- I. Relays:
  - 1. Provide relays for all discrete outputs.
  - 2. Characteristics: Plug-in, spade terminal style with pilot light and retainer clip. All relays shall be DPDT rated 10A, minimum. DIN-rail mount relays.
  - 3. Manufacturer shall be Square D, Type KU, or equal.
- J. Wireway:
  - 1. Provide covers for all wireway.
  - 2. For all stand-alone enclosures provide 3-inch width wireway, minimum.
  - 3. Size width and depth based on 50 percent of area fill. Check the applicable codes to verify fill.
- K. Install pertinent final I/O lists, elementary diagrams, and PLC card wiring diagrams in the enclosure of each PLC provided under this Contract. Provide a drawing pocket inside the existing enclosure.

- L. Provide a new set of painted steel double doors on the existing Passavant enclosure. Doors shall be gasketed, three-point latching with full locking handle. Include a drawing pocket on the inside of one door.

## 2.05 PLC HIGH-SPEED PEER-TO-PEER COMMUNICATION SYSTEMS

- A. General:
  - 1. Communication shall be via Modbus TCP over the existing fiber optic ring network to the existing SCADA system network.
  - 2. Minimum data communication speed shall be 10 Megabits per second (MBPS).

## 2.06 PLC ACCESSORIES

- A. 24 VDC Power Supply:
  - 1. Provide a sufficient quantity of 24 VDC power supplies as necessary to power PLC equipment and instrumentation connected to the PLC.
  - 2. Power supplies shall be manufactured by Acme Electric Corporation, Model DR Series, LAMBDA Electronic, Acopian, or equal. Power supplies shall meet, or exceed, the following requirements.
    - a. UL 508 listed, CE approved.
    - b. DIN-rail mounted.
    - c. Removable, pluggable connections for input and output power.
    - d. Local output status indication light.
    - e. Overload Protection - Current limited to a preset value.
    - f. 86 percent efficient.
    - g. Output Voltage - 24 VDC +5 percent adjustable.
    - h. Temperature Range - -20 to 50 degrees C.
    - i. Mean lifetime of 500,000 hours.
    - j. Two-year warranty.
    - k. Ripple and Noise - 24 mV RMS, 200-mV peak to peak.
    - l. Accept input voltages of both 120 VAC and 240 VAC.
    - m. Fully enclosed, touch-safe.
- B. I/O Signal Surge Suppressors:
  - 1. Provide I/O surge suppression for all discrete and analog signals terminating or originating out of doors or in other buildings and as specified in Section 17000.
  - 2. PLC Transient Voltage Surge Suppression (TVSS) – Metal Oxide Varistor (MOV) based surge suppression with an active tracking filter.
    - a. Provide one power protection device for each PLC enclosure.
    - b. Manufacturer – Emerson Network Power, Model Islatrol IE; or equal.
    - c. Minimum of 160 Joules protection between line-neutral, line-ground, and neutral-ground for a total of 480 Joules protection.
    - d. Response Time – Less than 1 nanosecond (in Normal mode).
    - e. 40kOhm surge capability on an 8x20 microsecond waveform.
    - f. UL1449 listed for safety and performance.
    - g. Manufactured by an ISO 9001 company.
    - h. Load side sine wave tracking circuitry.
    - i. Arrays of MOVs shall be located directly on the load side terminals and line side terminals to minimize response time.
    - j. Enclosure – sand packed or epoxy filled.
- C. Human-Machine Interfaces (Industrial Workstations):
  - 1. Provide HMI in new control panels as specified or as shown on Contract Drawings.
  - 2. Height of centerline of setpoint station shall be between 4 feet 9 inches and 5 feet 0 inches above finished floor.

3. Setpoint stations shall be by Proface, no substitutions.
  4. Setpoint stations shall have the following characteristics:
    - a. Touchscreen.
    - b. 17-inch diagonal display.
- D. Uninterruptible Power Supply:
1. Provide one DIN-rail mounted UPS with sufficient battery modules to afford 30 minutes of backup at full power draw.
  2. UPS shall be Phoenix Contact QUINT series.
  3. Mount UPS on the subpanel in a location that facilitates heat dissipation and accommodate the manufacturer's recommended offsets from nearby devices.
- E. Ethernet Switches (DIN-Rail Mounted):
1. Provide one DIN-rail mounted Ethernet switch panel mounted to the PLC subpanel to facilitate communication between the PLC and plant SCADA network.
  2. Switch shall be configured to provide redundant fiber optic ring function with seamless integration with the existing Ethernet switches.
  3. Ethernet switch shall be N-Tron, model 508FX2-SC.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Verify field measurements are as shown on Drawings.
- C. Verify that required utilities are available, in proper location, and ready for use.
- D. Beginning of installation means installer accepts conditions.
- E. Verify grounding of system.

### 3.02 PANEL FABRICATION

- A. Install in accordance with manufacturer's instructions.
- B. Wire Labeling:
  1. All wiring shall be labeled within 1.0-inch of stripped sheathing.
  2. Wire label text shall be visible in its installed location without manual manipulation.
  3. Wire shall carry the same wire number for an entire contiguous segment.
  4. Wires shall be labeled via machine-generated print on polyester or polyvinyl film.
  5. In the event that labels begin to fall off or text begins to smudge, or otherwise begin to become illegible, within one year of panel delivery to the site, the CONTRACTOR shall remove all labels within the panel with new labels at the CONTRACTOR's own expense. In this case, the ENGINEER must approve replacement labels.
- C. Device Labeling - All subpanel-mounted devices shall be labeled.
  1. Devices that do not require external power (24 VDC or 120 VAC) shall be labeled via machine-generated print on polyester or polyvinyl film. Print shall not be capable of being washed off, smudged, or erased. Labeled components include, but are not limited to, individual terminal blocks, control relays, individual fuses, individual I/O surge suppressors, and grounding bars.
  2. Devices that require 24 VDC external power or 120 VAC shall be labeled via machine engraved plastic nameplates utilizing white text on black background. Nameplates shall

be secured to the subpanel via permanent adhesives. Labeled components include, but are not limited to, disconnect switches, TVSS, power supplies, PLC backplanes, circuit breakers, DIN-rail strips, radios, Ethernet switches, UPSs, and convenience receptacles.

3. Exemptions – Individual PLC I/O modules only.

D. Supplier-Fabricated Cabling – All cabling fabricated by the panel fabricator.

### 3.03 SHOP TESTING

A. To verify that all PLCs are ready for system programming, the system's integrator shall perform the following shop testing prior to shipment to the site:

1. Perform a test configuration on all PLC modules to verify that all PLC CPUs communicate with the associated I/O modules, including inter-rack communication.
2. Perform a test configuration of all device servers to verify that the PLC communicates with a Modbus device connected to each device server.
3. Install the battery backup, UPS, and power supplies, simulate all device outputs to the PLC, and verify that the signals are read properly at the PLC. As part of the testing of the UPS, fully charge the UPS battery and disconnect line power from the UPS and verify that:
  - a. "Power Loss" is sensed by the PLC when line power is disconnected.
  - b. Verify that when the UPS battery low that "Low UPS Battery" is sensed by the UPS.
  - c. Record the time it takes for the UPS battery to completely drain from full charge once line power is disconnected from the PLC panel.
4. Point test all PLC I/O to verify that all I/O modules are correctly wired to the terminal strips and that the PLC I/O modules function properly. Testing shall be performed between terminal points on the I/O module to the terminal strip the electrician will terminate field wiring to.
5. Leave all configuration programs in the PLC CPU.
6. Perform testing to verify that the Ethernet communication between the PLCs is in accordance with the Manufacturer's requirements.

B. After all testing has been successfully completed, contact the ENGINEER to schedule an in-shop inspection by the ENGINEER. CONTRACTOR shall have the personnel that performed the testing present to perform random verification of the tests performed by the integrator.

C. Submit a written report to the ENGINEER prior to scheduling ENGINEER's in-shop inspection.

D. The CONTRACTOR shall furnish all instruments and a qualified engineer to properly perform all tests required.

### 3.04 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. All electrical work performed in fabrication and installation of PLC systems shall be in full accordance with the requirements of the Division 16 (Electrical) specifications.

### 3.05 SYSTEM PROGRAMMING

A. The programmer shall provide all system programming to implement system description. The programmer shall modify all programming to meet the requirements of the OWNER.

B. The programmer shall provide additional programming services as required by OWNER if system needs modification to function properly.

- C. Programmer shall provide for programming of an additional 25 points of I/O. If these services are not used a credit shall be provided to the OWNER.
- D. The CONTRACTOR and programmer shall schedule system programming with the OWNER. Upon request, the programmer shall visit the site within 24 hours of request.

### 3.06 MANUFACTURER'S OR SYSTEM INTEGRATOR'S FIELD SERVICES

- A. Provide a minimum of four, eight-hour days of on-site time for supervision of installation and hardware troubleshooting at ENGINEER's request. The four days of on-site time may be required over a span of one month. Written notification of the days required for troubleshooting and installation supervision will be sent to the CONTRACTOR 10 business days prior to the first required day.

### 3.07 DEMONSTRATION AND OPERATION

- A. Provide systems demonstration under provisions of Sections 01620, 01640, and 01660.
- B. Demonstrate operation and programming of controller.
- C. Demonstration shall include, but not be limited to, the following:
  - 1. Demonstrate all alarms.
  - 2. Demonstrate changing of all setpoints.
  - 3. Demonstrate actions upon alarm.
  - 4. Demonstrate actions upon power loss.
  - 5. Demonstrate all control logic.

### 3.08 TRAINING

- A. Provide four hours of on-site training for six persons. Topics covered shall include troubleshooting, maintenance, and replacement of PLC enclosure equipment.

### 3.09 CERTIFICATION OF TESTING

- A. Unless waived in writing by the ENGINEER, all tests shall be made in the presence of a duly authorized representative of the OWNER. When the presence of such representative is so waived, certified results of the tests made and the results thereof shall be furnished by the CONTRACTOR.
- B. All tests shall be performed in the presence of the OWNER. Written notice of all tests shall be given the OWNER at least two weeks in advance.

### 3.10 TEST EQUIPMENT

- A. The CONTRACTOR shall furnish all instruments and a qualified engineer to properly perform all tests required.

### 3.11 FACTORY-TRAINED SUPERVISION

- A. The CONTRACTOR shall include in his work the providing of necessary factory trained supervision to check over equipment for proper functioning before putting the equipment into operation as may be required by these specifications. This shall include establishing a simulated fault on checking out the coordination of the protective devices.

- B. Point-to-point test of all wiring.
- C. Functional test of all equipment, modes, alarms, controls.

END OF SECTION

## SECTION 17101

### PROGRAMMING SERVICES

#### PART 1 GENERAL

##### 1.01 SCOPE

- A. OWNER's System Integrator shall provide the following services related to this Section as part of Bid Item 3 – Cash Allowance for PLC and SCADA System Work:
  - 1. Functional requirements for the programming of the PLCs specified under section 17100 and the configuration of the OWNER's existing version of HMI software, GE iFIX.
- B. OWNER's System Integrator is:

KAMAN Automation  
245 Cooper Avenue  
Tonawanda, NY 14150  
Telephone: (716) 206-0061
- C. The CONTRACTOR is responsible for coordinating all work with the OWNER's System Integrator.

##### 1.02 RELATED SECTIONS

The specifications sections listed below are an integral part of this equipment specification and the CONTRACTOR shall be responsible for providing these sections to the equipment suppliers:

- A. Section 01331 - SHOP DRAWING PROCEDURES.
- B. Section 01620 - EQUIPMENT - GENERAL.
- C. All Division 17 specifications.

##### 1.03 REFERENCES

- A. NEMA ICS 1 - General Standards for Industrial Control and Systems.
- B. NEMA ICS 3 - Industrial Systems.
- C. ISA - Standards 5.1 and 5.4.
- D. IEC - 1131.3 Programming Standard.

##### 1.04 DEFINITIONS

- A. I/O lists – When references are made to the “I/O Lists,” it is implicit that derived I/O, included in the “Functional Designation” column, shall be included.
- B. Supervisory or HMI Software – Supervisory Control and Data Acquisition (SCADA) software. Under this project, the OWNER's existing software shall be modified to accommodate the improvements implemented under this project.
- C. Physical I/O Point – An input or output wired to a PLC I/O module.

- D. Equipment Identification Number – Numbers developed by the ENGINEER to identify equipment in the field, in PLC programs, and in supervisory programs. Equipment Identification Numbers are shown on the PLC I/O lists in “Item No” and “Equipment Designation” columns. Equipment Identification Numbers are in accordance with ISA standards 5.1 and 5.4.
- E. Functional Designation – Column of the PLC I/O lists that identifies some of the PLC I/O registers required for each physical I/O point. Functional designations are in accordance with ISA standards 5.1 and 5.4. The functional designation shall always be identified in conjunction with the item number for each physical I/O point.
- F. I/O Type – A PLC register type. Referring to either an integer, floating point (or real), or digital register.

#### 1.05 SUBMITTALS

- A. Shop Drawings – Submit under provisions of Sections 01620 and 01331. The following submittal requirements are to complement the requirements and format set forth in Section 17000.
  - 1. Submit detailed meeting minutes documenting all discussions from coordination workshops with the OWNER.
- B. Operation and Maintenance Manual – Submit under provisions of Sections 01620 and 01781. The following submittal requirements are to complement the requirements and format set forth in Section 17000.
  - 1. Finalized process control descriptions created under this section and updated to detail the completed operational sequence. Update the I/O list to include additions, deletions, and corrections. Submit control description in Microsoft Word and the I/O list in Microsoft Excel.
  - 2. Formally submit an electronic copy of the fully documented PLC and HMI programs on DVD, including all custom created function block (DFB) logic. Final PLC programs shall not be password protected.
- C. Project Record Documents – Submit under provisions of Sections 01620 and 01780. The following submittal requirements are to complement the requirements and format set forth in Section 17000.
  - 1. Revise AutoCAD drawings of individual I/O cards to reflect scaling of each analog input and output.

#### 1.06 TRAINING

- A. Provide training at the OWNER’s facility for a minimum total time as specified below.
- B. Pre-startup training shall consist of two identical, 2-hour sessions prior to startup of the new PLC. Both sessions may not occur on the same day.
- C. Post-startup training shall consist of two identical, 2-hour sessions prior to startup of the new PLC. Both sessions may not occur on the same day.
- D. Training shall include the following:
  - 1. Detail of the improvements implemented under this project.



## 1.07 COORDINATION

- A. Coordinate the compatibility of the hardware, software, and programming with the existing system and facility operation. Coordination shall include, but not be limited to:
  - 1. Programs effectively address all of the requirements of the system for control, display, and operation.
  - 2. Equipment will execute the programs to obtain the intended operation.
- B. Coordinate with the VFD supplier while the VFD supplier is onsite providing their startup services. During this time, confirm messaging over Modbus TCP is functioning properly between the PLC and VFD. Programmer shall take the lead on validating the VFD does not require a local reset after a loss of communications or a loss of VFD power.
- C. Make changes in programming to provide the intended operation.
- D. Coordinate demonstration to OWNER with the CONTRACTOR, OWNER, and ENGINEER. Request for demonstration date shall be in writing no less than two weeks in advance of the proposed date.
- E. Provide four (4), two-hour meetings with the OWNER and ENGINEER at the OWNER's facility to coordinate requirements for PLC and HMI programming. As a minimum, meetings shall cover:
  - 1. Operational sequences.
  - 2. Setpoint station configuration.
  - 3. Sequence of construction.
  - 4. Programming status
- F. Coordinate I/O states accordingly:
  - 1. Communicate normal state of I/O contacts in new and existing equipment with the supervisory software programmer.
  - 2. Communicate whether I/O contacts to and from new and existing equipment are momentary or maintained.
  - 3. Communicate the type, zero, and span for analog signals, new and existing, which are I/O to and from the SCADA system PLCs.

## 1.08 EXTRA MATERIALS

- A. Programmer shall supply their own license of Modicon Unity and their own iFIX development license to implement the programming changes specified herein.
- B. OWNER shall supply their own license once installation and programming is complete.

## PART 2 PRODUCTS

### 2.01 Ownership and Delivery of Software Programs

- A. Software License Agreement (SLA) – Included with the cost of this specification section shall include all licensing fees and royalties (i.e., Compensation) necessary for the OWNER to possess, troubleshoot, maintain, append, and modify the Programmable Logic Controller (PLC) and Human-Machine Interface (HMI) programs furnished with the system supplied herein. It is understood by the OWNER that modification of these software programs by the OWNER within the warranty period, without the written consent of the program supplier, may void the remainder of the product warranty.
- B. Interim Delivery of Programs – Furnish current-to-date electronic copies of PLC and/or HMI programs at the request of the OWNER or an OWNER's assignee.

- C. Final Delivery of Programs – At the time of Final Completion, furnish to the OWNER two (2) electronic copies of the completed programs on DVD-ROM. Furnish two (2) replacement copies each time the program is modified thereafter. Utilize the date in the program revision number, i.e., a program modified on December 12, 2012, shall carry the revision number 12212012.
- D. All programs, as well as all aspects of the programs, shall be unlocked, unencrypted, and unprotected. Custom function blocks shall not be protected or hidden.

## PART 3 EXECUTION

### 3.01 PROGRAMMING REQUIREMENTS

- A. All programming shall be in accordance with the latest revision of IEC 1131-3 (PLC Programming Standards). All PLC programming shall be performed using MODICON Unity Pro V6.1 programming software.
- B. Scale all inputs and outputs in units agreed upon with the OWNER.
- C. Interaction with the supervisory software – The PLC shall store all data within its own memory completely configured and ready to be accessed by the supervisory software program without further modification within the supervisory program. Program all I/O as described in the I/O lists accordingly:
  - 1. All analog inputs and outputs listed in the I/O lists shall be available in registers scaled within the PLC to engineering units, as agreed upon with the OWNER. Utilize floating point registers for all analog input data. Integers may be used for runtimes, counters, and totalizers.
  - 2. All discrete inputs and outputs listed in the I/O lists shall be available in digital registers in the PLC. Discrete signals may be packed into integer registers only as follows: for Hand-Off-Auto selector switches, Local-Remote selector switches.
  - 3. All setpoints shall be written to the appropriate PLC real (floating point) registers. Develop default setpoints with the OWNER and ENGINEER during system startup. Default setpoints shall be stored in non-volatile RAM and shall not be lost during PLC power outages.
  - 4. Run Time Totalization – Provide individual runtimes in registers for all pumps, mixers, drives, and other motors that have run indication wired to a PLC. Run times shall be configured in hours, resettable only by plant personnel through the supervisory software.
  - 5. Flows – Calculate running, daily running, and yesterday's flow totals of all flows monitored at one-minute intervals and write each to a register.
  - 6. Alarm Enable – Provide an alarm suppression digital register for each physical and derived alarm. Alarm enables shall be enabled (high/1) by default. Identify alarm enable bits in the PLC program by using the tag modifier \_AE. Setting an alarm enable bit low shall disable alarming of the associated alarm.
- D. HMI (GE iFIX) Improvements - Program the new Proface Industrial PC, supplied under Section 17100. Coordinate HMI application improvements with OWNER. Conform with OWNER's existing standards. Submit proposed screen improvements to OWNER for OWNER review and approval prior to implementing changes. Revise HMI application per OWNER's comments.
- E. Where changes in PLC programming are necessary to prevent nuisance alarming or unintentional nuisance operation of equipment, the programmer shall perform the programming at no additional cost to the OWNER.

### 3.02 PLC PROGRAM TAG FORMAT

- A. Group Individual I/O Types (Floating Point, Integer, Digital Registers) in Contiguous Address Ranges – Prior to developing control logic, quantify the number of each I/O type that will be required within each PLC and provide contiguous blocks of I/O addresses that will accommodate the known PLC addresses and 20-percent expansion. Do not, for example, assign an integer register in the middle of a discrete block of I/O or a real (floating point) register in the middle of a block of integer I/O.
- B. Equipment identification numbers and associated I/O addresses shall be consistent throughout the PLC system. For instance, if influent flow transmitter equipment designation is FIT-1000, the physical analog input should be FI\_1000 and the high level alarm should be FAH\_1000\_AL, with an alarm enable bit of FAH\_1000\_AE, with a user-adjustable setpoint tag of FAH\_1000\_SP, with a running flow total of FQ\_1000, with a daily flow total FQ\_1000\_Daily, with daily minimum of FI\_1000\_DLO, etc. Supervisory and PLC programs, operating, mechanical, and electrical documentation shall utilize the same equipment identification numbers.
- C. Utilize functional designations. A short list of commonly used functional designations is as follows and shall be used whenever possible:

AI_	Analyzer Indication	FAL_	Flow Alarm Low
AAL_	Analyzer Alarm Low	FQ_	Flow Totalization
AAH_	Analyzer Alarm High	IAH_	Current Alarm High
AALL_	Analyzer Alarm Low-Low	II_	Current (amps) Indication
AAHH_	Analyzer Alarm High-High	JA_	Power Alarm
FI_	Flow Indication	KQ_	Runtime Totalization
FAH_	Flow Alarm High	LI_	Level Indication
LAH_	Level Alarm High	VAH_	Vibration Alarm High
LAL_	Level Alarm Low	VAL_	Vibration Alarm Low
LQ_	Level Totalization	WI_	Weight Indication
OC_	Open/Stop Control	WAH_	Weight Alarm High
CC_	Close/Start Control	WAL_	Weight Alarm Low
PI_	Pressure Indication	WQ_	Weight Totalization
PAL_	Pressure Alarm Low	YI_	Run Indication
PAH_	Pressure Alarm High	YA_	Fail Indication
SI_	Speed Indication	YQ_	Start Counter
SC_	Speed Control	ZI_	Position Indication
TI_	Temp Indication	ZIO_	Position Indication Open
TAH_	Temp Alarm High	ZIC_	Position Indication Closed
TAL_	Temp Alarm Low	ZC_	Position Control
VI_	Vibration Indication		

- D. Utilize “modifiers” to tag names to further identify registers. A short list of commonly used modifiers is as follows and shall be used whenever possible:

_AL	Alarm bit (digital)	_DAVG	Daily average (real)
_SP	Setpoint (real)	_DAILY	Daily total (real)
_DLO	Daily low/minimum (real)	_AE	Alarm enable (digital)
_DHI	Daily high/maximum (real)	_AT	Alarm type (real)
_SEL	Alarm channel select (real)	_AUTO	Auto position (digital)
_HAND	Hand position (digital)	_OFF	Off position (digital)
_LOC	Local position (digital)	_REM	Remote position (digital)

1. Integers may be used to indicate multiple switch positions. When integers are used for this purpose, the tag shall be formatted as follows: HSI\_XXXX\_HOA, as in Hand Switch Indication, loop number XXXX, Hand-Off-Auto. For instance, if the switch is two-position “Local/Remote” switch the tag may be HSI\_1000\_LR.
  2. Do not use tag modifiers such as \_SPH for “Setpoint High.”
- E. Alarming – Provide physical registers and alarm registers (\_AL tag) for all physical alarm inputs. Alarms derived from an analog input only require an alarm tag (\_AL).

### 3.03 SPECIFIC PROGRAMMING REQUIREMENTS

- A. PLC Diagnostics – As a minimum, for each PLC provide communication failure alarms, low memory battery alarms, PLC panel power loss alarms, and PLC Uninterruptible Power Supply (UPS) battery low alarm. If the supplied PLC or UPS has additional diagnostics, provide programming to accommodate these additional indications or alarms.
- B. Building E:
1. Thickener/Clarifier Drives – Facilitate communication between the PLC and VFDs via Modbus TCP. Each drive is equipped with a physical, three-position Local-Off-Remote handswitch.
    - a. In Local, the drive shall run continuously based upon start/stop pushbuttons located at the MCC. PLC control shall be prohibited.
    - b. In Off, the drive shall not run.
    - c. In Remote, virtual Start and Stop pushbuttons, accessible via the HMI, shall be used to start and stop the drives.
    - d. Derived Alarms – Drives are intended to run continuously. As such, monitor the status of Run Indication and generate a Clarifier Drive Not Running alarm when the drive stops running. Implement a 60-second hardcoded time delay.
  2. Distribution Box Polymer Mixer – Mixer is equipped with a physical, three-position Local-Off-Remote handswitch integral to the VFD.
    - a. In Local, the mixer shall run continuously based upon start/stop pushbuttons located at the MCC. PLC control shall be prohibited.
    - b. In Off, the mixer shall not run.
    - c. In Remote, The mixer shall start when distribution box flowrate increases above a user-adjustable start setpoint for a user-adjustable time delay (units: minutes). Once started, the mixer shall run at a user-defined speed until distribution box flowrate decreases below a user-adjustable stop setpoints for a user-adjustable time delay (units: minutes).
    - d. Derived Alarms – Mixer is intended to run when there is flow through the Distribution Box. As such, monitor the status of Run Indication and generate a Distribution Box Mixer Not Running alarm when the mixer stops running and there is flow through the Distribution Box. Implement a 60-second hardcoded time delay.

3. Distribution Box Polymer Feed System (PS-1) – The system is equipped with integral, Local-Remote selection.
  - a. In Local, the system may be started and run at user-adjustable speed (in RPM) as configured via the system's integral keypad.
  - b. In Remote, virtual Hand-Off-Flow-TSS Trim selector switch shall be accessible via the HMI.
    - i. In Manual, the system shall run at a user-adjustable speed set through the HMI in RPM using virtual start and stop pushbuttons accessible through the HMI
    - ii. In Off, the system shall not run.
    - iii. In Flow, system speed shall be commanded to run at a user-adjustable minimum speed when distribution box flowrate is at a user-adjustable minimum flowrate. System speed shall be commanded to run at a user-adjustable maximum speed when distribution box flowrate is at a user-adjustable maximum flowrate. Pump shall proportionately respond to changes in flowrate between the minimum and maximum flowrates. The polymer system shall stop running when flowrate is less than the minimum flowrate for a user-adjustable time delay (units: minutes). In TSS Trim mode, the system shall be flow paced with TSS trim (compound loop control). The affect the TSS trim has on the output to the feed system shall be user adjustable as 0 to 30 percent. A setpoint of 0 percent removes the trim affect. Coordinate upper adjustable value with the Owner.
  - c. Derived Alarms – Polymer feed system is intended to run when there is flow through the Distribution Box. As such, monitor the status of Run Indication and generate a Polymer Feed System Not Running alarm when the polymer feed system stops running and there is flow through the Distribution Box as indicated by 020-FE/FIT-800. Implement a 60-second hardcoded time delay.
4. Belt Filter Press Polymer Feed System (PS-2) the system is equipped with integral, Local-Remote selection.
  - a. In Local, the system may be started and run at user-adjustable speed (in RPM) as configured via the system's integral keypad.
  - b. In Remote, the system shall run based on input from the Belt Filter Press control panel.
  - c. In Off, the system shall not run.
5. Thickened Sludge Pumps (TSP-1 and TSP-2) – Each pump shall utilize a three-position Local-Off-Remote switch mounted in the field.
  - a. In Local, the pump shall run at a speed manually set at the VFD and shall be started/stopped using pushbuttons at the MCC. PLC control of this equipment shall be prohibited.
  - b. In Off, the pump shall not run. PLC control of this equipment shall be prohibited.
  - c. In Remote, PLC control shall be enabled through the PLC utilizing a virtual Manual-Off two-position selector switch accessible through the HMI.
    - i. In Remote-Manual, the pump shall run at a manual speed setpoint adjustable through the HMI using virtual start and stop pushbuttons accessible through the HMI.
    - ii. In Remote-Off, the pump shall not run.
6. Belt Filter Press.
  - a. The Belt Filter Press system shall be equipped with a PLC-based control panel from the manufacturer.
  - b. Control shall be as specified in Section 11350.

C. Building B:

1. Coagulation Basin Blowdown Pumps – Each pump shall utilize a three position Local-Off-Remote switch mounted at the local control panel.
  - a. In Local, the pump shall run at a speed manually set at the VFD and shall be started/stopped using pushbuttons at the control panel. PCL control of this equipment shall be prohibited.
  - b. In Off, the drive shall not run. PLC control shall be prohibited.
  - c. In Remote, PLC control shall be enabled through plant SCADA, via an Ethernet control panel to the Sludge Blowdown PLC.
2. Coagulation Basin Dewatering Pumps – Each pump shall utilize a three position Local-Off-Remote switch mounted at the local control panel.
  - a. In Local, the pump shall run at a speed manually set at the VFD and shall be started/stopped using pushbuttons at the control panel. PCL control of this equipment shall be prohibited.
  - b. In Off, the drive shall not run. PLC control shall be prohibited.
  - c. In Remote, PLC control shall be enabled through plant SCADA, via an Ethernet control panel to the Sludge Blowdown PLC.

3.04 PLC PROGRAMMER'S FIELD SERVICES

- A. In addition to time required for PLC program installation, provide a minimum of five eight-hour days of on-site time for PLC program troubleshooting at ENGINEER's request. The on-site time may be required over a span of one month. Written notification of the days required for troubleshooting and installation supervision will be sent to the CONTRACTOR 10 business days prior to the first required day.

3.05 ADDITIONAL PROGRAMMING SERVICES

- A. The programmer shall provide all system programming to implement system description.
- B. The programmer shall provide additional programming services as required by ENGINEER if system needs modification to function properly.
- C. Programmer shall provide for programming of an additional 25 points of physical I/O and the derived I/O associated with each physical point. Provide a credit to the OWNER for programming services not utilized towards the additional 25 I/O points.
- D. The CONTRACTOR and programmer shall schedule system programming with the OWNER. Upon request, the programmer shall visit the site within 24 hours of request.

END OF SECTION

## SECTION 17350

### WEIGHT SCALE

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. The CONTRACTOR shall furnish and install, ready to operate, the following level sensing systems, complete with all necessary accessories to monitor tank weight/level as indicated herein in compliance with the following specifications and as shown on the Contract Drawings.
  - 1. It is a requirement of this specification that the elements of the system be provided by a single supplier. This supplier shall have total responsibility for the equipment and services specified in this Section, as well as all other Division 17 specifications.
  - 2. For ease of identification, designations for the various components of the metering systems to be furnished and installed are specified in Section 11333.

##### 1.02 RELATED SECTIONS

- A. Section 01331 - SHOP DRAWING PROCEDURES.
- C. Section 01620 - EQUIPMENT-GENERAL.
- D. Section 01780 - RECORD DOCUMENTS.
- E. Section 01781 - OPERATION AND MAINTENANCE DATA.
- F. Section 11333 - POLYMER FEED SYSTEM.
- F. All Division 16 Specifications.
- G. All Division 17 Specifications.

All electrical equipment and wiring shall be in full compliance with Division 16 - Electrical Specifications.

##### 1.03 REFERENCES

- A. NEMA ICS 1 - General Standards for Industrial Control and Systems.
- B. NEMA ICS 3 - Industrial Systems.
- C. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
- D. NFPA 70 - National Electrical Code.

##### 1.04 SUBMITTALS

- A. Submit under provisions of Sections 01331 and 01620. The following submittal requirements are to complement the requirements and format set forth in Section 17000.
  - 1. Scaled AutoCAD drawings illustrating the actual mounting locations for each transmitter. Indicate electrical connections labeling the origin and destination of all wiring. Use terminal labeling as found on the transmitter terminal blocks. On this drawing, show the signal wiring

utilized, as well as any other contacts that may not be utilized under the current design. Indicate dimensions of scale platforms and transmitter. Drawing shall be drafted specifically for this project and indicate to the ENGINEER that the CONTRACTOR fully understands the requirements of this section.

- B. Operation and Maintenance Manual – Submit under provisions of Sections 01620 and 01781.
  - 1. Refer to Section 17000 for operation and maintenance manual format and content.
- C. Project Record Documents – Submit under provisions of Sections 01620 and 01780.
  - 1. Refer to Section 17000 for project record documents format and content.

#### 1.05 COORDINATION

- A. CONTRACTOR is responsible to verify with the supplier that the weight scale platforms are chemically resistive to the chemical drums being monitored.

#### 1.06 WARRANTY

- A. Two-year warranty covering the transmitter and scale platform.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. The level sensing equipment specified in Section 11333 shall be the following or equal:
  - 1. Scale - FloQuip -DR20LP.
  - 2. Transmitter – FloQuip Wizard 4000

#### 2.02 EQUIPMENT DESIGN

- A. Weight Scale
  - 1. Drum scales shall be of the hydraulic cell type. Scale shall be sized to accept a storage tank up to 30 inches in diameter. Platform shall be of epoxy coated steel.
  - 2. Scale shall be of the dual load cell design. Weight shall be transferred via a pivoted platform to a pair of load cells of the shear beam strain gauge type. Flexible cable shall connect the load cells to a transmitter to facilitate indication and scale configuration functions at operator height. Cable length shall be as required for installation as shown on the Contract Drawings.
  - 3. Scale shall have an accuracy of 1/4 of 1 percent with minimum increments of no more than 1/2 lb. Scale capacity shall range from 0 to 2,000 lbs. Configured span shall accommodate the actual weight of the full tank.
  - 4. Scales unit shall operate on 120 VAC.
- B. Weight Transmitter
  - 1. The system electronics for the weight transmitter shall measure and convert the weight as output by the weight scale and convert into a 4-20 mADC signal directly proportional to remaining tank volume.
  - 2. Memory shall be non-volatile EEPROM. Configuration parameters and alarm setpoints shall not be lost upon power loss.
  - 3. The transmitters shall be capable of sending its output signal into a load of 350 ohms.
  - 4. Weight transmitter shall have the following additional features:
    - a. Indicator shall be housed in a NEMA 4X, UL approved enclosure.
    - b. Indicator shall independently monitor two scales of the same capacity as well as monitor the totals of the two scales.



- c. Each channel shall display net remaining, daily usage, total amount used, rate of feed, days until empty, tare weight, and gross weight.
- d. Data log function shall store the daily usage for each of the previous 10 days.
- e. Each scale shall have an independently, adjustable 4-20 mA output signal base upon net weight or feed rate.
- f. Transmitter shall provide two independently adjustable output contacts for low and low-low levels.
- g. The system electronics shall be calibrated by a programming keypad.
- h. A multi-digit LED indicator readout shall be provided calibrated in net weight. Digital indicator shall be two line by 16 characters per line capable of displaying alphanumeric characters. Weight shall be displayed to the tenths position. LCD shall utilize six digits, 0.4 inches high, minimum.
- i. Labeled terminal strips for all external electrical connections.
- j. Two multipurpose, user-adjustable relays rated 5 amps at 250 VAC non-inductive.
- k. Transmitter shall operate on 120 VAC.

C. Performance Requirements

- 1. Full-scale accuracy shall be better than 1/4 of 1 percent.
- 2. Minimum increments shall be 0.5 pounds.
- 3. Operating temperature range of the electronics shall be 32 to 122 degrees F.
- 4. Power Requirements – 120 VAC.

2.03 ACCESSORIES

- A. Nameplates – Refer to Section 17000.
- B. Mounting Hardware – Provide stainless steel mounting hardware as necessary to mount equipment in locations as described in the Contract Documents.
- C. Cabling – Provide power and signal, cable and conduit to locate transmitters according to Section 17000.

2.04 CONTROLS

- A. All electrical equipment and wiring shall be in full conformance with Division 16 - Electrical Specifications.
- B. Refer to Contract Drawings for wiring requirements.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's requirements.
- B. All electrical work performed in fabrication and installation of the transmitters shall be in full accordance with the requirements of the Division 16 specifications.
- C. Mount all equipment provided herein in accordance with specification section 17000.
- D. Configure the unit to drive the 4-20 mA output to 3.7 mA in the event the scale or transmitter detect an internal failure.

### 3.02 MANUFACTURER'S OR SYSTEM INTEGRATOR'S FIELD SERVICES

- A. Final Acceptance – Include 1/2 day for a manufacturer authorized service representative to test equipment to demonstrate that:
  - 1. The scale and transmitter has been properly installed, properly calibrated, and is functioning as specified.
  - 2. Configuration and setpoints are not lost upon power loss. This shall be tested by disconnecting the transmitter from power for 30 minutes.
- B. Installation – Include 1/2 day for a manufacturer authorized service representative to verify proper mounting of the equipment, including mounting technique, mounting surface, and functional location.

Verify acceptable venting for measurement in closed vessels.
- C. Training – Provide 1/2 day of instruction for four persons to be conducted at the project site with a manufacturer's representative. Notify the ENGINEER and OWNER in writing a minimum of 2 weeks in advance. Training shall include calibration, trouble shooting, and maintenance.

### 3.03 CERTIFICATION OF TESTING

- A. Unless waived in writing by the ENGINEER, all tests shall be made in the presence of a duly authorized representative of the OWNER. When the presence of such representative is so waived, certified results of the tests made and the results thereof shall be furnished by the CONTRACTOR.
- B. All tests shall be performed in the presence of the OWNER. Written notice of all tests shall be given the OWNER at least 2 weeks in advance.

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:**

<b><u>NAME OF FORM</u></b>	<b><u>PAGE NUMBER(S)</u></b>
Minority Business Utilization Report- Part A	6 & 7
Waiver Request	8
Erie County Water Authority Minority Business Enterprise Joint Venture Disclosure Affidavit	9
Erie County Water Authority Minority Business Enterprise Utilization Report - Part B	10 & 11
Minority Business Enterprise Utilization Report - Part C	12
Minority Business Enterprise Utilization Report - Part D	13

**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 CERTIFICATION	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 _____	

Appendix A

A-



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. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
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 \_\_\_\_\_

<div style="display: flex; justify-content: space-between;"> <div> <u>EQUAL OPPORTUNITY OFFICIAL</u> </div> <div> <u>TITLE</u> </div> </div>		<u>DATE</u>
--	--	-------------

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: \_\_\_\_\_

<b>MBE</b>	<b>PART B CONTRACT AMOUNT OF ESTIMATE</b>	<b>TOTAL EXPENDED TO DATE</b>	<b>ESTIMATED AMOUNT REMAINING</b>

\* 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: \_\_\_\_\_

<b>MBE</b>	<b>TOTAL AMOUNT EXPENDED</b>

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

## APPENDIX B-1

### VAN DE WATER WATER TREATMENT PLANT RESIDUALS HANDLING UPGRADES

#### PROJECT NO: 201900208

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](mailto: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 B-2

**[THIS FORM IS INTENDED TO BE USED AS AN EXHIBIT OR ADDENDUM TO ANY SUBCONTRACT—IT SHOULD NOT BE USED BY ITSELF AS A SOLE CONTRACT DOCUMENT]**

### ADDENDUM AGREEMENT

This Addendum to the Agreement (“Addendum Agreement”) between [ **Insert name of Upstream Contractor or Upstream Subcontractor**] (hereinafter referenced as “Contractor”) and [ **Insert name of Downstream Subcontractor**] (hereinafter referenced as “Subcontractor”) is being entered into by the parties for any and all work done for, with, or on behalf of **the Erie County Water Authority** (hereinafter the “Authority”) under the Primary Contract No. \_\_\_\_, Project No. \_\_\_\_ [ **Insert Project Description**] with [ **Insert name of Contractor**], a copy of which may be obtained from [ **Insert name and contract information of the entity**].

In accordance with the terms and conditions of the Primary Contract No. \_\_\_\_ entered into with the Erie County Water Authority, an **ACORD25-Certificate of Liability Insurance** and **ACORD 855 NY-NY Construction Certificate of Liability Addendum** shall be provided evidencing the following insurance is currently maintained and in force with an insurance carrier approved to do business in the State of New York and maintaining an A.M. Best Rating of A- or better showing the Authority as Certificate Holder and additional insured. You should share these requirements with your current insurance agent, broker or insurance company.

#### **Insurance Requirements**

Prior to the commencement of any work designated in any contract or agreement to which this Addendum Agreement is attached, and until at least the final completion and acceptance of the work under the contract or agreement to which this Addendum Agreement is attached, the Subcontractor, at its sole expense, shall maintain the following minimum insurance on its own behalf, and furnish to the Authority certificates of insurance evidencing same and reflecting the effective date of such coverage as listed below. In no event shall the failure to provide this proof, prior to the commencement of the work, be deemed a waiver by the Authority of the Subcontractor’s obligation to maintain the insurance set forth herein. The insurance required shall not be canceled, not renewed or materially changed after the issuance of the certificate of insurance required by this Addendum Agreement.

#### **A. Worker’s Compensation, Occupational Disease & Employer’s Liability Insurance:**

Worker’s Compensation, Occupational Disease & Employer’s Liability Insurance in accordance with the applicable laws and statutes to cover any injuries or illness to employees and any other person eligible for compensation, and the liability of the employer thereof to any person or organization, as follows:

**Worker’s Compensation & Occupational Disease:** Statutory

**Employer's Liability:** \$1,000,000 bodily injury by accident or disease, except for work work/employers subject to the New York Worker's Compensation Law, in which this insurance shall be unlimited.

All such coverage shall: not contain any exclusion for injuries to sole proprietors, partners, members of limited liability companies or executive officers of any corporate entity; and provide for a "Waiver of Subrogation" endorsement in favor of the Owner/Contractor.

Any Contractor/Subcontractor with a principal place of business located outside of the State of New York must include New York under Part 3A of the policy.

**B. Commercial General Liability:**

Commercial general liability insurance as provided under the ISO Commercial General Liability Coverage Form, CG 00 01, or its equivalent, for claims of Bodily Injury, Property Damage and Personal and Advertising Injury, with limits of not less than:

Per Occurrence and Personal & Advertising Injury-	\$1,000,000.00
General Aggregate & Products/Completed Operations Aggregate-	\$2,000,000.00
Fire Damage Legal Liability/Damage to Rented Property-	\$100,000.00
Medical Payment (per-person)	\$5,000.00

The coverage must include the following:

1. Liability assumed by the insured in an "insured contract" as that term is defined in the ISO Commercial General Liability Coverage Form, CG 00 01.
2. Products/Completed Operations liability for a period of three years after acceptance of the work.
3. A per project aggregate of \$ 2,000,000.00.
4. A "Waiver of Subrogation" Endorsement in favor of the Owner/Contractor.
5. Exterior Insulation Finish System ("EFIS") coverage must be specifically included or provided separately where the Contractor/Subcontractor work under this Agreement or in any contract or agreement to which this Addendum is attached in any way involves EFIS.
6. **The coverage shall not include any provision, definition, exclusion or endorsement which in any way would serve to eliminate the insurance to any insured or additional insured for liability for bodily injury or property damage arising from work performed in New York State, for claims made under the New York Labor Law or for claims made by employees, subcontractors and employees of subcontractors hired to perform work by any insured or additional insured pursuant to work that is subject to this Addendum Agreement or in any contract or agreement to which this Addendum Agreement is attached.**



7. The insurance is to be provided through insurers licensed and admitted to do business in the State of New York, with an A. M. Best financial rating of “A-“ or better, or otherwise specifically approved by the Owner.

The Authority, its officers, directors, partners, representatives, agents and employees must be named as Additional Insureds on a primary and non-contributory basis on both the ongoing and completed operations coverage required herein utilizing the ISO endorsements: CG 2010 04 13 or CG 2038 04 13 (or their equivalent) for ongoing operations; and CG 2037 04 13 (or its equivalent) for completed operations. The Additional Insured coverage shall contain no special limitation or limitation on the scope of the protection afforded to the Additional Insureds.

**C. Commercial Automobile Liability Insurance:**

Commercial Automobile Liability insurance covering the ownership, maintenance and use of all Owned, Non-Owned and Hired Vehicles by the Subcontractor with combined Bodily Injury and Property Damage limits including pollution transit coverage of \$1,000,000.00 per accident. The Authority, its officers, directors, partners, representatives, agents and employees must be named as Additional Insureds on a primary and non-contributory basis. A “Waiver of Subrogation” in favor of the Authority must be included.

**D. Commercial Umbrella/Excess Liability Insurance:**

Commercial Umbrella/Excess Liability Insurance with limits of \$1,000,000.00 per occurrence and a \$1,000,000.00 aggregate. The Authority, its officers, directors, partners, representatives, agents and employees must be named as Additional Insureds on a primary and non-contributory basis. A “Waiver of Subrogation” in favor of the Authority must be included.

**E. Pollution Liability:**

Where the Subcontractor is performing work that is subject to this Addendum Agreement or to any contract or agreement to which this Addendum Agreement is attached, that involves abatement or remediation of hazardous substances or any manner of environmental work, pollution liability coverage applicable to the type of work/operations being performed in the amount of \$5,000,000.00 per occurrence and \$5,000,000.00 aggregate limit. The Authority, its officers, directors, partners, representatives, agents and employees must be named as Additional Insureds on a primary and non-contributory basis. A “Waiver of Subrogation” in favor of the Authority must be included.

**F. Builder’s Risk/Installation Floater:**

“All Risk” Property Insurance coverage afforded by a Builder’s Risk/Installation Floater or its equivalent insuring all materials, equipment and supplies provided by the Subcontractor and intended to become a permanent part of the construction, whether stored on the premises, away from the project site and/or while in transit, in an amount equal to the replacement cost

of such materials, equipment and supplies. A “Waiver of Subrogation” in favor of the Authority must be included.

**G. Owned and/or Rented Tools or Equipment:**

Property insurance covering all owned, rented, leased and/or borrowed tools or equipment of the Subcontractor or used by the Subcontractor in connection with the work that is subject to this Agreement or to any contract or agreement to which this Addendum is attached, in an amount equal to the replacement cost of such tools or equipment. A “Waiver of Subrogation” in favor of the Authority must be included.

**JOB-SITE SAFETY:**

The Authority makes no representation with respect to the physical conditions or safety of the Project Site. The Subcontractor shall, at its own expense, protect from injury its employees engaged in the performance of the Work. The prevention of accidents to all workers engaged in the Subcontractor’s work and others affected by the Subcontractor’s work is the responsibility of the Subcontractor. Subcontractor shall comply with all applicable federal, state, labor and local laws, regulations and codes concerning safety.

For purposes of this Addendum Agreement, “Project Site” means the entire construction site or the various separately identifiable part of the site described in any contract or agreement to which the Addendum Agreement is attached, and as described in the Primary Contract with the Authority.

**WORKERS COMP IMMUNITY WAIVER:**

In any and all claims against the Authority by any employee of the Subcontractor, anyone directly or indirectly employed by the Subcontractor (including any of the Subcontractor’s subcontractors) or anyone for whose acts the Subcontractor may be liable, the indemnification obligation shall not be limited by any limitation on the amount or type of damages, compensation or benefits payable by or for the Subcontractor under workers’ compensation acts, disability benefit acts or other employee benefit acts.

**HOLD HARMLESS / INDEMNIFICATION:**

To the fullest extent permitted by law, Subcontractor shall defend, indemnify and hold harmless Authority and its heirs, executors, administrators, successors, assigns, affiliates, employees and agents (hereinafter referenced as “Owner Indemnitees”) from and against any and all actions, claims, liabilities, damages, losses and expenses, including but not limited to bodily injury, death and property damage, and reasonable attorney’s fees and costs (including those incurred in the defense of any such underlying claim, as well as those incurred in the enforcement of this Addendum Agreement and/or in the prosecution of any claim for indemnification by Authority) arising out of or resulting from, or alleged to arise out of or result from, the Subcontractor’s work (including the work by any of the Subcontractor’s subcontractors), except to the extent caused by the negligence or willful misconduct of any Owner Indemnitees.

**MISCELLANEOUS:**

If any term or provision of this Addendum Agreement conflicts with or is otherwise inconsistent with any term or provision in the Primary Contract or any prior written agreement entered between the parties, the terms and provisions contained herein shall govern and control.

This Addendum Agreement shall be binding upon and inure to the benefit of the parties hereto and their successors and permitted assigns. This Addendum Agreement, its terms and any claims arising therefrom, shall be interpreted and construed in accordance with the laws of the State of New York.

This Addendum Agreement may be executed via facsimile or email in any number of counterparts, all of which taken together shall constitute one and the same agreement. No waiver by a party of any breach by the other party of any of the provisions of this Agreement shall be deemed a waiver of any preceding or succeeding breach of the same or any other provisions hereof. No such waiver shall be effective unless in writing and then only to the extent expressly set forth in writing.

No modification or amendment of this Addendum Agreement shall be effective unless in writing and signed by both parties and approved in writing by the Authority. If any term or provision of this Addendum Agreement shall to any extent be invalid or unenforceable, the remainder of this Addendum Agreement shall not be affected thereby, and each provision of this Addendum Agreement shall be valid and enforceable to the fullest extent permitted by law.

**[Insert name of Upstream Contractor  
or Upstream Subcontractor]**

**[Insert name of Downstream  
Subcontractor]**

---

[Name of Representative]

---

[Insert Name by Representative]

(Print name and title)

(Print name and title)

Date:

Date:

## Appendix C

### Prevailing Wage Rate Schedule



Andrew M. Cuomo, Governor

Roberta Reardon, Commissioner

Erie County Water Authority

Kailin Schwan, Engineer  
285 Delaware Ave  
Suite 500  
Buffalo NY 14202

Schedule Year 2020 through 2021  
Date Requested 09/16/2020  
PRC# 2020009582

Location Van De Water WTP  
Project ID# 201900208  
Project Type Residuals handling upgrades at the ECWA Van De Water Water Treatment Plant.

### 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](http://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](http://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](http://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](http://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, contemporaneous, 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

Kailin Schwan, Engineer  
285 Delaware Ave  
Suite 500  
Buffalo NY 14202

Schedule Year 2020 through 2021  
Date Requested 09/16/2020  
PRC# 2020009582

Location Van De Water WTP  
Project ID# 201900208  
Project Type Residuals handling upgrades at the ECWA Van De Water Water Treatment Plant.

### 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: \$ _____	Contract Type:	
Approximate Starting Date: ____/____/____	<input type="checkbox"/> (01) General Construction	
Approximate Completion Date: ____/____/____	<input type="checkbox"/> (02) Heating/Ventilation	
	<input type="checkbox"/> (03) Electrical	
	<input type="checkbox"/> (04) Plumbing	
	<input type="checkbox"/> (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](http://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](mailto: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](http://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.

**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*

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#### **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.







## 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](mailto:dol.misclassified@labor.ny.gov). All complaints of fraud and violations are taken seriously. You can remain anonymous.**

**Employer Name:**

IA 999 (09/16)



# 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](http://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](http://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 or 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 requirements 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 than 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](http://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

09/01/2020

**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

09/01/2020

**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

09/01/2020

**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. When 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

09/01/2020

**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
55%	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**

**09/01/2020**

**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\* \$ 36.49

\* 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: \$ 29.05\*

\* 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 to 2000 to 3500 to 5000 to 6500 to 8000  
\$ 13.50 \$ 14.60 \$ 16.40 \$ 20.05 \$ 25.55 \$ 29.20

Supplemental benefits per hour:

0 to 2000 to 6500 to 8200  
\$ 13.01\* \$ 23.55\* \$ 29.05\*

\* NOTE - add 3% of the posted straight time or applicable premium wage rate.

3-41

## Elevator Constructor

09/01/2020

**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

09/01/2020

**JOB DESCRIPTION** Glazier

**DISTRICT** 3

### ENTIRE COUNTIES

Allegany, Cattaraugus, Chautauqua, Erie, Genesee, Niagara, Orleans, Wyoming

### WAGES

Per hour: 07/01/2020 05/01/2021

Glazier	\$ 27.50	Additional \$ 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**

**09/01/2020**

**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
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**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
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50%      60%      70%      80%

Supplemental Benefits per hour:

1st and 2nd      \$ 19.64  
All other terms      \$ 24.69

3-4

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**Ironworker****09/01/2020**

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**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

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**Ironworker****09/01/2020**

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**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**

09/01/2020

**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

09/01/2020

**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**

**09/01/2020**

**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

09/01/2020

**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

09/01/2020

**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	\$ 5.06
	*plus 3% of wage paid	*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

09/01/2020

**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

09/01/2020

**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	\$ 9.98	\$ 10.23	\$ 10.48
	*plus 3% of hourly wage	*plus 3% of hourly wage	*plus 3% of hourly wage	*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

09/01/2020

**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

09/01/2020

**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**

**09/01/2020**

**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**

**09/01/2020**

**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: Entire 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**

**09/01/2020**

**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 \$ 29.31  
and Tile Finisher

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**

**09/01/2020**

**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

09/01/2020

**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

09/01/2020

**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, Revinus 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**

**09/01/2020**

**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, Convoing Vehicles Convoing 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 Guniting 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), Revinus 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	\$ 39.89
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

09/01/2020

### 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

09/01/2020

**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
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#### 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

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**Operating Engineer - Survey Crew - Consulting Engineer****09/01/2020**

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**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
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**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

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**Painter****09/01/2020**

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**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

09/01/2020

### 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

09/01/2020

### 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

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**Plumber****09/01/2020**

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**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

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**Roofer****09/01/2020**

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**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
Asphalt 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**

**09/01/2020**

**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 - \$13.82 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

3-71

## Sprinkler Fitter

09/01/2020

**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, Schuylar, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Washington, Wayne, Wyoming, Yates

## WAGES

Per hour	07/01/2020
Sprinkler	\$ 35.01
Fitter	

## SUPPLEMENTAL BENEFITS

Per hour

Journey person	\$ 26.62
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## 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
\$ 16.94	\$ 18.82	\$ 20.44	\$ 22.31	\$ 24.18	\$ 26.05	\$ 27.92	\$ 29.79	\$ 31.67	\$ 33.54

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									

<b>Teamster - Building / Heavy&amp;Highway</b>	<b>09/01/2020</b>
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**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

<b>Teamster - Building / Heavy&amp;Highway</b>	<b>09/01/2020</b>
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**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**

**09/01/2020**

**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

☐ 10 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

**NYSDOL Bureau of Public Work Debarment List 07/28/2020**

**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	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 IMPROVEMENT	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	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	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	*****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

**NYSDOL Bureau of Public Work Debarment List 07/28/2020**

**Article 8**

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	01/09/2023
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 KISCO 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	01/09/2023
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

**NYSDOL Bureau of Public Work Debarment List 07/28/2020**

**Article 8**

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 AVENUE ATLANTA 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 DOUGLSTON 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 2C SYRACUSE NY 13205	12/04/2018	12/04/2023
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 FLOOR STATEN 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 55 POUGHQUAG 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 REPAIR 145 LODGE AVE HUNTINGTON 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 CONTRACTOR 35-34 31ST STREET LONG 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	01/09/2023
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 AVENUE PORT 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 BINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	NYC		DUARTE LOPES		66-05 WOODHAVEN BLVD. STE 2 REGO 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

**NYSDOL Bureau of Public Work Debarment List 07/28/2020**

**Article 8**

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 GILLET 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 BALDWINVILLE NY 13027	02/03/2020	01/09/2023
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

**NYSDOL Bureau of Public Work Debarment List 07/28/2020**

**Article 8**

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 STREETS YRACUSE 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 HIGHWAY ROCKVILLE CENTRE NY 10457	04/07/2016	04/07/2021
DOL	DOL		J.A. HIRES CADWALLADER		P.O BOX 100 200 LATT BROOK PARK HORSEHEADS 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 HIGHWAY ROCKVILLE 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		JASON W MILLIMAN		C/O ROCHESTER ACOUSTICAL P O BOX 799 HILTON 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 AVENUE OSWEGO 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 LATT 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 LATT BROOK PARK HORSEHEADS 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 296 EAST AURORA NY 14052	07/29/2015	07/29/2020
DOL	DOL		JON E DEYOUNG		261 MILL RD P.O BOX 296 EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DOL		JORI PEDERSEN		415 FLAGER AVE #302 STUART 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 HIGHWAY ROCKVILLE CENTRE NY 10457	04/07/2016	04/07/2021
DOL	NYC		JOSEPH FOLEY		66-05 WOODHAVEN BLVD. STE 2 REGO 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



**NYSDOL Bureau of Public Work Debarment List 07/28/2020**

**Article 8**

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 GILLET 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	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

**NYSDOL Bureau of Public Work Debarment List 07/28/2020**

**Article 8**

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 PROFESSIONAL PAINTING OF CNY	1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL	*****9445	MCLEAN M WALSH	ELITE PROFESSIONAL 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 CONTRACTORS	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

**NYSDOL Bureau of Public Work Debarment List 07/28/2020**

**Article 8**

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	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	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	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	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

**NYSDOL Bureau of Public Work Debarment List 07/28/2020**

**Article 8**

DOL	DOL		RICHARD REGGIO		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	DOL	*****9148	RICHARD TIMIAN	RICH T CONSTRUCTI ON	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		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	*****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 GILLET PA 16923	03/12/2018	03/12/2023
DOL	DOL		SHANE BURDICK		2238 BAKER ROAD GILLET 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

**NYSDOL Bureau of Public Work Debarment List 07/28/2020**

**Article 8**

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		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		TEST		P.O BOX 123 ALBANY NY 12204	05/20/2020	05/20/2025
DOL	DOL	****5570	TESTA CORP		50 SALEM STREET - BLDG B LYNNFIELD MA 01940	01/23/2017	01/23/2022
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	VIALE 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 DOUGLSTON 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

**NYSDOL Bureau of Public Work Debarment List 07/28/2020**

**Article 8**

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	*****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

February 19, 2021

GHD Consulting Services Inc.  
Matthew Skuse  
285 Delaware Avenue, Suite 500  
Buffalo, New York 14202

**Re: Pre-Renovation Asbestos and Lead-Based Paint Inspection  
Erie County Water Authority  
- Van De Water Waste Treatment Plant**

Dear Mr. Skuse,

Enclosed please find a copy of the Asbestos and Lead-Based Paint Inspection Report for the above referenced property. If after reviewing this report you have any questions, or if we can be of assistance in any other way, please do not hesitate to call.

Thank you for the opportunity to be of service to GHD Consulting Services.

Sincerely,  
Stohl Environmental, LLC.



Sean Hanley  
NYS DOL Certified Asbestos Inspector



# **Pre-Renovation Inspection**

**Asbestos  
Lead-Based Paint**

**of**



**Van de Water Waste Treatment Plant**

**Prepared for**



**Prepared by**



---

**3860 California Road, Orchard Park, New York 14127  
PHONE (716) 312-0070 FAX (716) 312-8092  
[WWW.STOHLENVIRONMENTAL.COM](http://WWW.STOHLENVIRONMENTAL.COM)**

**Conditions as of January 8, 2021**

## Summary Tabulation

<b>Section 1.0</b>	<b>Asbestos Inspection .....</b>	<b>2</b>
1.1	Introduction .....	2
1.2	Executive Summary .....	3
1.3	Purpose .....	5
1.4	Methodology for Inspection .....	5
1.5	Inspection Report.....	7
<b>Section 2.0</b>	<b>Lead-Based Paint Inspection.....</b>	<b>9</b>
2.1	Introduction .....	9
2.2	Methodology .....	12
2.3	Inspection Report.....	13
2.4	XRF Spectrum Analyzer Report.....	14
<b>Appendix A</b>	<b>Site Photos.....</b>	<b>16</b>
<b>Appendix B</b>	<b>General Conditions of Inspection .....</b>	<b>17</b>
<b>Appendix C</b>	<b>Certifications and Licenses .....</b>	<b>21</b>
<b>Appendix D</b>	<b>Laboratory Report and Chain of Custody.....</b>	<b>22</b>

## **Section 1.0 Asbestos Inspection**

### **1.1 Introduction**

Stohl Environmental was retained by GHD Consulting Services to inspect the Van de Water Waste Treatment Plant for the presence of materials suspected of containing asbestos (ACBM).

Stohl Environmental was charged with:

- \* locating suspect asbestos containing materials,
- \* sampling of these materials to ascertain asbestos content, and
- \* identifying the locations and estimated quantities of the confirmed asbestos containing materials.

The information following this introduction details the amount of asbestos present in this facility and the location of the ACBM (asbestos containing building 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 building materials (ACBM). The following is a list of suggested reading and information sources relating to asbestos:

- \* New York State Department of Labor Industrial Code Rule 56
- \* National Emission Standard for Hazardous Air Pollutants (NESHAPS)
- \* Occupational Safety and Health Administration (OSHA 1926.1101, 1910.134, 1910.1020, 1910.1200, 1910.145, 1910.95, 1926.58)
- \* Environmental Protection Agency rule CFR 763.46 Asbestos Hazard Emergency Response Act

## 1.2 Executive Summary

The scope of services included the identification of suspect asbestos containing building materials in areas of planned renovations; sampling and analysis of the suspect materials; and identifying the locations and estimated quantities of the confirmed asbestos containing materials.

The inspection for the Van de Water Waste Treatment Plant was conducted on January 8, 2021 and revealed the following materials as suspected of containing asbestos:

HAN	Description	ACM?
<b>101</b>	<b>Mastic of Live Electrical Panels</b>	<b>Assumed</b>
300	Quarry Tile - Grout	NO
301	Quarry Tile - Mortar	NO
302	Quarry Tile - Mud Bedding	NO
<b>500</b>	<b>Jacket Insulation of CO2 Tank</b>	<b>YES</b>
501	Tar Wrap on Pipes inside CO2 Tank	NO
<b>502</b>	<b>Wire Cloth Wrap</b>	<b>YES</b>
<b>600</b>	<b>Caulk at Duct Seams</b>	<b>YES</b>
601	Gasket at Hatches	NO
602	Gaskets of Piping	NO
<b>603</b>	<b>Endcap Mastic of Pipe Insulation</b>	<b>YES</b>
604	Panels of Accordion Compactor	NO
<b>605</b>	<b>Valve Packings – Note 3</b>	<b>Assumed</b>
606	Covering on Inductor Coils	NO

Sampling and analysis of the suspect materials under Polarized Light Microscopy, and where necessary under Transmission Electron Microscopy, revealed the following materials as asbestos containing building materials (ACBM):

HAN	Material Description and Approximate Location	Friability / Condition (Note 1)	Approximate Quantity (Note 2)
101	Mastic of Live Electrical Panels – Located in Control Room Electrical Closet – Note 3	NF / I	25 sq ft
500	Mastic Surrounding Jacket Insulation of CO2 Tank – Located at Exterior of Building	NF / SD	100 sq ft
502	Wire Cloth Wrap – Located inside De-energized Electrical Panel in Blowdown	F / I	< 10 sq ft
600	Caulk at Duct Seams – Located on All Duct Seams Associated with the Lime Feeder, Storage and Conveyor Systems	NF / I	20 sq ft
603	Endcap Mastic of Pipe Insulation – Located on Pipes for Accordion Compactor, Sample Tanks, Equalization Tank, Sludge Retention Tank, Sludge Thickener Tank, Pressure Filter Feed Pumps, Filtrate Transfer Pumps, and Mixing/Aging Pumps	NF / I	200 sq ft
605	Valve Packings – Located at all Pipe Valves – Note 3	F / I	< 10 sq ft

## 1.2 Executive Summary (Continued)

### Notes to Executive Summary

- Note 1:** Friability/Condition:  
F=Friable: a material that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure, or is capable of being released into the air by hand pressure.  
NF=Non Friable: a material that when dry cannot be crumbled, pulverized, or reduced to hand pressure, and is not capable of being released into the air by hand pressure.  
I=Intact: Asbestos material that has not crumbled, been pulverized, or otherwise been damaged or disturbed, and the material's matrix has not noticeably deteriorated.  
D=Damaged: Asbestos material that has deteriorated or sustained physical injury demonstrated by separation of the ACM into layers, separation of the ACM from the substrate, flaking, blistering, crumbling, water damage, scrapes, gouges, or other signs of physical injury.  
SD=Significantly Damaged: Damaged asbestos where the damage is extensive and severe.
- Note 2:** Quantities are approximate, and are only associated with the areas of planned renovation. Additional asbestos containing materials may be located outside areas of planned renovation that were not surveyed, assessed or quantified during this inspection.
- Note 3:** This material was assumed to contain asbestos based on Stohl Environmental's experience on similar projects, because the material was adhered to another asbestos containing material (or adjacent to other materials needing abatement) or due to inaccessibility of the material on the day of inspection and must be managed as such.

### **1.3 Purpose**

The purpose of the asbestos inspection was to identify and quantify the types of asbestos containing building materials (ACBM) in the building. Samples of the suspect materials were collected for analysis by an independent laboratory, and the condition of each material noted in relation to its potential to be disturbed. The potential for fiber release was also considered.

The report is generated for the exclusive use of GHD Consulting Services Inc. and/or its representatives or agents, and is not designed to serve as a specification for abatement. Before requesting bids for abatement of materials identified in this report, the owner is strongly encouraged to contract with a consultant to provide this valuable service. A specification assures that all contractors are bidding on the same methodology and following the specific requirements for the work to be performed.

### **1.4 Methodology for Inspection**

All work performed by Stohl Environmental 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), and Occupational Safety and Health Administration regulations 29 CFR 1910.1101 and 29 CFR 1910.134. All Stohl Environmental 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.

Each suspect asbestos containing building material (ACBM) was assigned a HOMOGENEOUS AREA NUMBER (HAN). Homogeneous areas are materials of like composition, color (in some instances), texture and appearance. As an example, homogeneous area #600 is Caulk at Duct Seams.

#### 1.4 Methodology for Inspection (Continued)

Based on the homogeneous areas, 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 collected by Stohl Environmental using the following procedures:

1. The surface to be sampled was sprayed with amended water (detergent and water) as necessary
2. A plastic sample bag was held to the surface sampled
3. The sample was collected using tools appropriate to the friability of the material sampled
4. Sample bags were labeled with a unique sample identification number
5. Samples were recorded on a Chain of Custody form, and submitted under strict chain-of-custody procedures to an ELAP and NYSDOH approved and certified laboratory for analysis

Samples were first analyzed using PLM, Polarized Light Microscopy in accordance with US Environmental Protection Agency Interim Method, 40 CFR Pt 763, Supt F, App A(7-1-87). For the sample results not considered definitive, additional analysis was performed under Transmission Electron Microscopy (TEM) in accordance with NYS DOH ELAP Item #198.4, for Non-friable Organically Bound Bulk Material (NOB). The results of this analysis confirmed whether or not a suspect materials actually contained asbestos. The confirmed materials are listed in **SECTION 1.2 Executive Summary**.

## 1.5 Inspection Report

The following table summarizes the results of the inspection work performed at:

### Van de Water Pump Station

HAN	Material Description	Sample Number	Sample Location	PLM Result (Note 1)	TEM Result (Note 2)	ACM Yes/No
101	Mastic of Live Electrical Panels	NA	NA	NA	NA	Assumed
300	Quarry Tile - Grout	0208-TP-300-1	Lime Storage Room	NAD	NA	NO
300	Quarry Tile - Grout	0208-TP-300-2	Lime Storage Room	NAD	NA	NO
301	Quarry Tile - Mortar	0208-TP-301-1	Lime Storage Room	NAD	NA	NO
301	Quarry Tile - Mortar	0208-TP-301-2	Lime Storage Room	NAD	NA	NO
302	Quarry Tile - Mud Bedding	0208-TP-302-1	Lime Storage Room	NAD	NA	NO
302	Quarry Tile - Mud Bedding	0208-TP-302-2	Lime Storage Room	NAD	NA	NO
500	Jacket Insulation of CO2 Tank	0208-TP-500-1	Exterior	10.8% Chrysotile	NA	YES
500	Jacket Insulation of CO2 Tank	0208-TP-500-2	Exterior	NA/PS	NA	YES
500	Jacket Insulation of CO2 Tank	0208-TP-500-3	Exterior	NA/PS	NA	YES
501	Tar Wrap on Pipes inside CO2 Tank	0208-TP-501-1	Exterior	NAD	NAD	NO
501	Tar Wrap on Pipes inside CO2 Tank	0208-TP-501-2	Exterior	NAD	NAD	NO
502	Wire Cloth Wrap	0208-TP-502-1	Electrical Panel in Blowdown	36.4% Chrysotile	NA	YES
502	Wire Cloth Wrap	0208-TP-502-2	Electrical Panel in Blowdown	NA/PS	NA	YES
600	Caulk at Duct Seams	0208-TP-600-1	Hoppers for Lime Storage	6.6% Chrysotile	NA	YES
600	Caulk at Duct Seams	0208-TP-600-2	Hoppers for Lime Storage	NA/PS	NA	YES
601	Gasket at Hatches	0208-TP-601-1	Hoppers for Lime Storage	NA/PS	NAD	YES
601	Gasket at Hatches	0208-TP-601-2	Sludge Retention Tank	NAD	NAD	NO
602	Gaskets of Piping	0208-TP-602-1	Sample Tank Room	NAD	NA	NO
602	Gaskets of Piping	0208-TP-602-2	Sample Tank Room	NAD	NAD	NO
602	Gaskets of Piping	0208-TP-602-3	Pressure Pump Room	NAD	NAD	NO
603	Woven Outer Layer of Pipe Insulation	0208-TP-603-1	Accordion Compactor	4.2% Chrysotile	NA	YES
603	Woven Outer Layer of Pipe Insulation	0208-TP-603-2	Lime Slurry Room	NA/PS	NA	YES
603	Woven Outer Layer of Pipe Insulation	0208-TP-603-3	Sample Tank Room	NA/PS	NA	YES
603	Woven Outer Layer of Pipe Insulation	0208-TP-603-4	Pressure Pump Room	NA/PS	NA	YES
604	Panels of Accordion Compactor	0208-TP-604-1	Accordion Compactor	NAD	NAD	NO



HAN	Material Description	Sample Number	Sample Location	PLM Result (Note 1)	TEM Result (Note 2)	ACM Yes/No
604	Panels of Accordion Compactor	0208-TP-604-2	Accordion Compactor	NAD	NAD	NO
<b>605</b>	<b>Valve Packings</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>Assumed</b>
606	Covering on Inductor Coils	0208-TP-606-1	Electrical Panel in Blowdown	NAD	NA	NO
606	Covering on Inductor Coils	0208-TP-606-2	Electrical Panel in Blowdown	NAD	NA	NO

**Notes to Inspection Table 1.5:**

- Note 1:** PLM= Analysis by Polarized Light Microscopy  
**Note 2:** TEM = Transmission Electron Microscopy. NYSDOH requires Non-friable Organically Bound (NOB) bulk materials be additionally analyzed by TEM if negative under PLM.  
**Note 3:** Material was previously sampled and analyzed as negative for asbestos as part of Previous Pre-Renovation Inspections, re-sampling is not necessary or cost effective for the client.  
**Note 4:** Material was previously sampled and analyzed as positive for asbestos as part of Previous Pre-Renovation Inspections, re-sampling is not necessary or cost effective for the client.  
**Note 5:** Non Suspect Material, Not Sampled  
**Note 6:** Inaccessible for Sampling, Assumed Positive  
**Note 7:** This material was assumed to contain asbestos based on Stohl Environmental's experience on similar projects, because the material was adhered to another asbestos containing material (or adjacent to other materials needing abatement) or due to inaccessibility to the material on the date of inspection and must be managed as such.
- NAD** = No Asbestos Detected  
**N/A** = Not applicable  
**NA/PS** = Not Analyzed / Positive Stop  
**Trace** = Less than 1% asbestos, material considered non-ACM  
**Chr** = Chrysotile Asbestos

## **Section 2.0 Lead-Based Paint Inspection**

### **2.1 Introduction**

Stohl Environmental was retained by GHD Consulting Services Inc. to inspect the Van de Water Waste Treatment Plant for the presence of surfaces containing lead-based paint (LBP).

Stohl Environmental was charged with:

1. locating suspect surfaces,
2. measuring lead concentrations on suspect surfaces using an X-ray fluorescence spectrum analyzer, and
3. bulk sampling for lab analysis where necessary.

Although this report is a comprehensive analysis of the lead-based paint in this structure, the following information, as well as a reading of the sources listed at the end of this section, will help ensure compliance to applicable rules, laws and regulations regarding lead based paint.

#### **TITLE X:**

On October 28, 1995, the Housing and Community Development Act of 1992 was signed into law. Title X, as this bill is commonly referred to, is comprehensive and significant in addressing lead poisoning and prevention. Under the Toxic Substances Control Act (TSCA), as amended by Title X, EPA is developing regulations governing lead-based paint hazard evaluation and abatement in private and public housing, public and commercial buildings and commercial structures. When the changes brought about by this legislation are fully defined and enacted, virtually all parties involved in ownership, rental, management, financing/lending, contracting/abatement, and insurance will be affected.

## **2.1 Introduction (Continued)**

Although it is recommended that property owners, lenders, insurers, etc. become familiar with the full content of Title X and the EPA regulations, an understanding of the following terms will assist in the interpretation of the results of this survey:

1. The term “lead-based paint” as used in Title X is defined as paint on surfaces with lead in excess of 1.0 mg/cm<sup>2</sup> (milligrams per centimeter squared) as measured by X-ray fluorescence (XRF) detector or 0.5 percent by weight.
2. The term “lead based paint hazard” is defined as any condition that causes exposure to lead sufficient to cause adverse human effects.
3. “Deteriorated LBP” is any interior or exterior LBP that is peeling, chipping, chalking, or cracking, or located on a surface or fixture that is damaged or deteriorated.
4. LBP on any “friction surface” is defined as any interior or exterior surface subject to damage by repeated impacts, such as painted floors and friction surfaces on windows.
5. LBP on any “impact surface” is defined as any interior or exterior surface subject to damage by repeated impacts, such as parts of door frames.
6. LBP on any “accessible surface” is defined as any interior or exterior surface accessible for a young child to mouth or chew, such as a window sill.
7. “Lead-contaminated dust” is defined as a surface dust in residential dwellings that contains an area or mass concentration of lead in excess of the standard to be established by EPA.

## **2.1 Introduction (Continued)**

### OSHA

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 defines construction work as "...work for construction, alteration and/or repair including painting and decorating" and further states "...the standard for the construction industry applies to all occupational exposure to lead in all construction work in which lead, in any amount, is present in an occupationally related context ... where the source of the lead is employment related..."

The employer must ensure that no worker is exposed to concentrations of lead in excess of the permissible exposure limit (PEL) for lead, which is an eight hour time weighted average (TWA) exposure of 50 mg/m<sup>3</sup> (micrograms per cubic meter). This means that the pre-project site must be inspected to determine if a lead hazard exists. If determined to exist, the employer must either perform an "Exposure Assessment" as defined in 29 CFR Part 1926.62 paragraph (d), or implement employee protective measures as prescribed in paragraph (d)(2)(v) including appropriate respiratory protection, personal protective clothing, change areas, hand washing facilities, biological monitoring, and training.

### HUD

The statutory requirements and foundations for HUD Guidelines can be found in Section 302 of the Lead-Based Paint Poisoning Prevention Act (LBPPPA).

Certain aspects of the HUD Guidelines are typically applied to public and commercial buildings. The most common adopted techniques used to identify LBP are X-ray Fluorescence Spectrum Analyzer (XRF) and Atomic Absorption Spectroscopy (AAS). HUD defines LBP as having an XRF reading greater than 1.0 mg of lead per centimeter squared, or a paint chip analyzed by AAS having greater than 0.5 percent lead by weight.

The above information coupled with this report will help assure compliance to applicable laws and regulations and protect the occupants and contractors from exposure while in the building.

## **2.2 Methodology**

Stohl Environmental used a Viken Spectrum Analyzer to test suspect painted surfaces on the Interior. Progression through the exterior and interior followed a clockwise direction around the floor plan. Each component tested is identified by its particular side of the building, labeled walls "A, B, C, or D". Side A of any room is always the same side as the front exterior entrance (or address side of the building). Side B is the side to the left of side A, and so on.

Representative surfaces/components were tested in a manner designed to adequately represent the different components, substrates, types of paint, construction and paint history throughout the building. Surfaces tested included interior walls, doors, structural members, windows and painted exterior components.

## **2.3 Inspection Report**

During the lead-based paint inspection conducted on January 8, 2021 the interior and exterior painted components of the site were inspected. Painted components were identified and tested based on component groups and paint history.

The XRF analysis indicated that the following painted surfaces have a lead content at greater than the Title X threshold (greater than 1.0 mg/cm<sup>2</sup>) for classification as lead-based paint. For any renovations undertaken that require demolition of these painted surfaces, contractors should be advised of the presence of lead, and required to comply with the aforementioned OSHA regulations for construction worker safety.

Component groups that were identified to contain LBP are:

Van De Water Pump Station:

- **All Structural Steel Associated with the Lime Slurry Conveyor**
- **All Yellow Tanks in Sample Tank Room**
- **All Green Tanks in Sample Tank Room**

(SEE THE TABLE IN SECTION 2.4 FOR XRF ANALYSIS OF INDIVIDUAL COMPONENTS/SUBSTRATES)

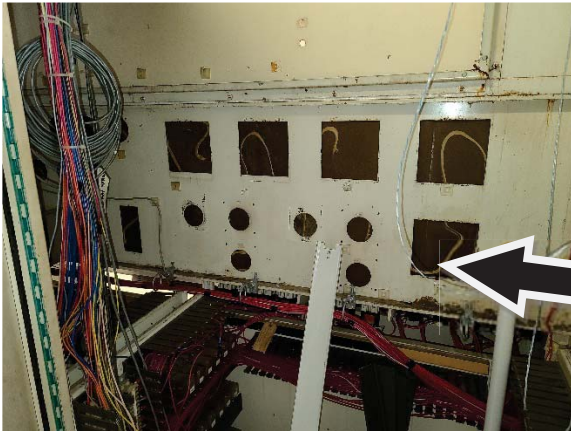
## 2.4 XRF Spectrum Analyzer Report

Reading No.	Room	Side	Component	Substrate	Color	Results	XRF Reading
1	Calibration						1
2	Calibration						1
3	Calibration						1.1
4	sludge loading area	A	escalator	Metal	White	Negative	0.2
5	sludge loading area	A	Wall	Glazed Block	Beige	Negative	-0.2
6	lime slurry conveyor	A	I-Beam	Metal	Green	Negative	0.9
7	<b>lime slurry conveyor</b>	<b>A</b>	<b>I-Beam</b>	<b>Metal</b>	<b>Green</b>	<b>Positive</b>	<b>1.3</b>
8	lime slurry conveyor	A	tank	Metal	Green	Negative	0.4
9	lime slurry conveyor	A	tank	Metal	Green	Negative	0.2
10	lime slurry conveyor	A	ladder	Metal	Green	Negative	0.2
11	lime slurry conveyor	A	Railing	Metal	White	Negative	0.1
12	lime slurry conveyor	A	I-Beam	Metal	Gray	Negative	0
13	lime slurry conveyor	A	I-Beam	Metal	Yellow	Negative	0.2
14	accordion compactor	A	I-Beam	Metal	White	Negative	0.1
18	accordion compactor	A	I-Beam	Metal	White	Negative	0.1
19	accordion compactor	A	Pipe	Metal	White	Negative	0.1
20	accordion compactor	A	Pipe	Metal	White	Negative	0.1
21	accordion compactor	A	compactor	Metal	White	Negative	0.1
22	accordion compactor	A	compactor	Metal	White	Negative	0.2
23	accordion compactor	A	Floor	Concrete	Red	Negative	0.1
24	<b>sample tank room</b>	<b>A</b>	<b>tank</b>	<b>Metal</b>	<b>Yellow</b>	<b>Positive</b>	<b>6.9</b>
25	sample tank room	A	tank	Metal	Yellow	Negative	0.2
26	sample tank room	A	tank	Metal	Yellow	Negative	0.2
27	<b>sample tank room</b>	<b>A</b>	<b>tank</b>	<b>Metal</b>	<b>Yellow</b>	<b>Positive</b>	<b>7.8</b>
28	<b>sample tank room</b>	<b>A</b>	<b>tank</b>	<b>Metal</b>	<b>Green</b>	<b>Positive</b>	<b>5.8</b>
29	sample tank room	A	steel beams	Metal	Brown	Negative	0.2
30	sample tank room	A	air compressors	Metal	Blue	Negative	0.1
31	sample tank room	A	Pipe	Metal	Red	Negative	0
32	sample tank room	A	Pipe	Metal	Blue	Negative	0
33	sample tank room	A	ladder	Metal	Yellow	Negative	0.9

Reading No.	Room	Side	Component	Substrate	Color	Results	XRF Reading
34	pressure pump area	A	tank	Metal	Yellow	Negative	0.1
35	pressure pump area	A	Pipe	Metal	Yellow	Negative	0.1
36	pressure pump area	A	Pipe	Metal	Yellow	Negative	0.1
37	pressure pump area	A	Pipe	Metal	Gray	Negative	0.1
38	room under accordion compactor	A	compactor	Metal	White	Negative	0.1
39	room under accordion compactor	A	Pipe	Metal	White	Negative	0.1
40	room under accordion compactor	A	tank	Metal	Green	Negative	0.1
41	room under accordion compactor	A	tank	Metal	Blue	Negative	0.1
42	electrical closet	A	Wall	Glazed Block	Gray	Negative	-0.1
43	electrical closet	A	panel	Metal	Green	Negative	0.1
44	CO2 tank	A	panel	Metal	White	Negative	0
45	CO2 tank	A	tank	Metal	White	Negative	0
46	CO2 tank	A	I-Beam	Metal	Black	Negative	0.7
47	blow down pump area	A	Electrical Panel	Metal	Red	Negative	0.1
48	blow down pump area	A	Floor	Concrete	Beige	Negative	0.1
49	Calibration						1
50	Calibration						1
51	Calibration						1



## Appendix A Site Photos



**Asbestos Material in Photo**

**HAN 101 – Mastic of Live Electric Panel - Assumed to be ACM as sampling was not possible**

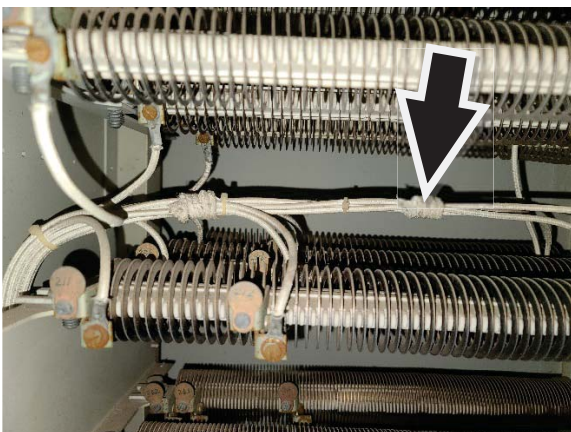
**See Section 1.2 for locations and approximate quantities**



**Asbestos Material in Photo**

**HAN 500 – Mastic Coating Jacket Insulation of CO2 Tank**

**See Section 1.2 for locations and approximate quantities**



**Asbestos Material in Photo**

**HAN 502 – Cloth Wire Wrap**

**See Section 1.2 for locations and approximate quantities**



### Asbestos Material in Photo

#### HAN 600 – Caulk at Duct Seams

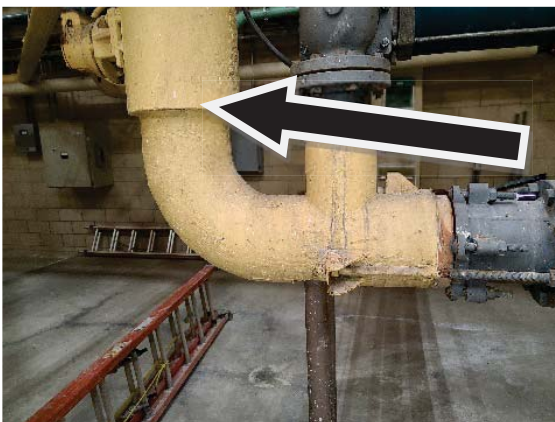
See Section 1.2 for locations and approximate quantities



### Asbestos Material in Photo

#### HAN 603 – Endcap Mastic of Pipe Insulation – Accordion Compactor

See Section 1.2 for locations and approximate quantities



### Asbestos Material in Photo

#### HAN 603 – Endcap Mastic of Pipe Insulation – Tank Sample Room

See Section 1.2 for locations and approximate quantities

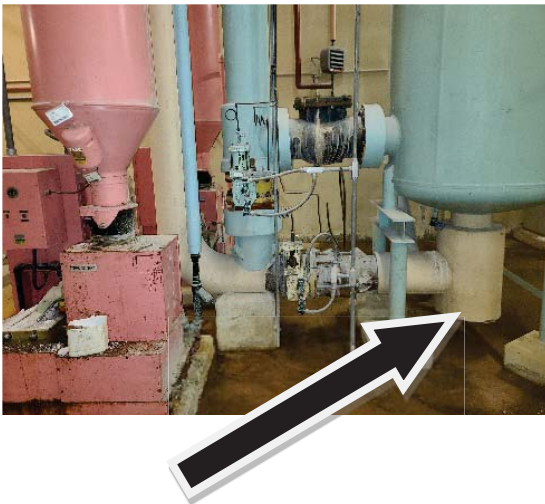




**Asbestos Material in Photo**

**HAN 603 – Endcap Mastic of Pipe Insulation – Pressure Filter Feed Pumps**

See Section 1.2 for locations and approximate quantities



**Asbestos Material in Photo**

**HAN 603 – Endcap Mastic of Pipe Insulation – Aging Tanks**

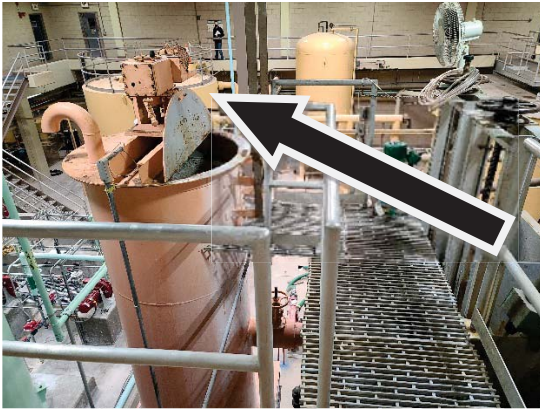
See Section 1.2 for locations and approximate quantities



**Lead Material in Photo**

**Structural Steel of Lime Slurry System**

See Section 1.2 for locations and approximate quantities



**Lead Material in Photo**

**Yellow Tanks in Sample Tank Room**

**See Section 1.2 for locations and approximate quantities**



**Lead Material in Photo**

**Green Tanks in Sample Tank Room**

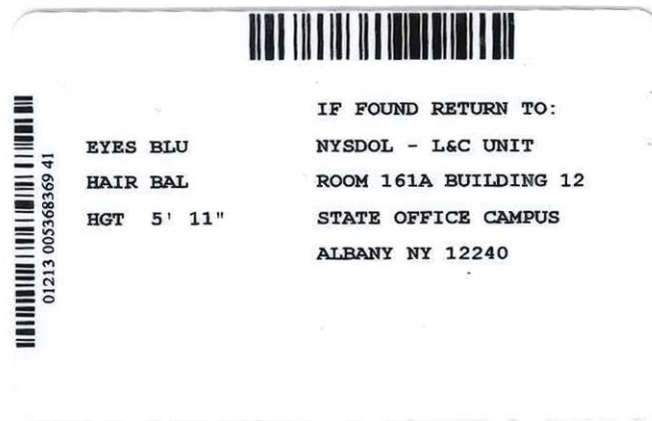
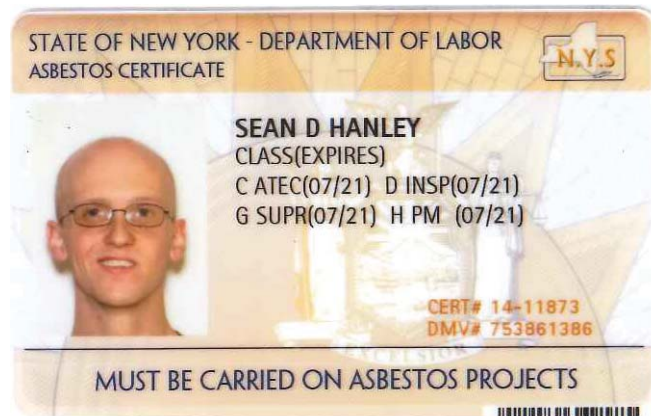
**See Section 1.2 for locations and approximate quantities**

## **Appendix B    General Conditions of Inspection**

1.     Stohl Environmental neither accepts nor implies any liability for the implementation of the recommendations found within this report.
2.     Stohl Environmental cannot be held responsible or liable for the misrepresentation of fact, misstatements or withholding of relevant information by those parties interviewed during this inspection.
3.     This report is based on the condition and contents present at the site on the day of the inspection. Stohl Environmental 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.
4.     An inspection or risk assessment for asbestos and lead-based paint relies heavily upon identification of homogeneous areas, with sampling and laboratory analysis then determined by the quantity of surfaces identified, generally accepted inspection protocols, regulatory requirements, and the inspector's or risk assessor'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 fact that both lead and asbestos fibers are not always uniformly distributed throughout suspect surfaces or materials. Although Stohl Environmental attempts to minimize the risk of a false positive or false negative result through a comprehensive inspection protocol, the possibility does exist, and could only be completely eliminated through testing and analysis of 100% of each suspect surface, which of course is not practical.

## **Appendix C    Certifications and Licenses**

## SEAN HANLEY



## NYS ASBESTOS CERTIFICATIONS

**PROJECT MONITOR**

**AIR MONITOR**

**INSPECTOR**

**SUPERVISOR**



**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**

Stohl Environmental LLC

3860 California Road

Orchard Park, NY 14127

FILE NUMBER: 00-0041

LICENSE NUMBER: 29408

LICENSE CLASS: FULL

DATE OF ISSUE: 02/17/2021

EXPIRATION DATE: 02/28/2022

Duly Authorized Representative – Christopher C Stohl:

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.

Amy Phillips, Director  
For the Commissioner of Labor



## **Appendix D    Laboratory Report and Chain of Custody**

Laboratory Reports

Chain of Custody Documents



Please Reply To:

**AmeriSci New York**

117 EAST 30TH ST.  
NEW YORK, NY 10016  
TEL: (212) 679-8600 • FAX: (212) 679-3114

***LABORATORY ELECTRONIC TRANSMITTAL***

**To:** Tony Franjoine  
Stohl Environmental, LLC.  
**Fax #:** (716) 312-8092

**Email:** labs@stohlenv.com, shanley@stohlenvironmental.com,  
pmaier@stohlenvironmental.com

**From:** Valeriu Voicu  
**AmeriSci Job #:** 221021702  
**Subject:** ELAP-PLM/TEM 3 day Results  
**Client Project:** 2020-728; GHD; Erie County  
Water Authority, Waste  
Treatment - 3750 River Road,  
Tonawanda, NY (Report  
Amended 2/19/2021)

**Date:** Friday, February 19, 2021  
**Time:** 16:08:46  
**Comments:**

**Number of Pages:** \_\_\_\_\_  
(including cover sheet)

NOTE: Attached report is to be considered preliminary until final review with accompanying analysis summary letter is issued.

CONFIDENTIALITY NOTICE: Unless otherwise indicated, the information contained in this communication is confidential information intended for use of the individual named above. If the reader of this communication is not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is prohibited. If you have received this communication in error, please immediately notify the sender by telephone and return the original message to the above address via the US Postal Service at our expense. Samples are disposed of in 60 days or unless otherwise instructed by the protocol or special instructions in writing. Thank you.

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NEW YORK, NY 10016  
TEL: (212) 679-8600 • FAX: (212) 679-3114

## PLM Bulk Asbestos Report

Stohl Environmental, LLC.  
Attn: Tony Franjoine  
3860 California Rd.  
  
Orchard Park, NY 14127

**Date Received** 02/10/21 **AmeriSci Job #** 221021702  
**Date Examined** 02/11/21 **P.O. #**  
**ELAP #** 11480 **Page** 1 of 6  
**RE:** 2020-728; GHD; Erie County Water Authority, Waste Treatment  
- 3750 River Road, Tonawanda, NY (Report Amended  
2/19/2021)

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
0208-TP-300-1 300 <b>Location:</b> Lime Storage Room - Quarry Tile Grout  <b>Analyst Description:</b> Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Cellulose Trace, Non-fibrous 100%	221021702-01	No	NAD (by NYS ELAP 198.1) by Valeriu Voicu on 02/11/21
0208-TP-300-2 300 <b>Location:</b> Lime Storage Room - Quarry Tile Grout  <b>Analyst Description:</b> Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Cellulose Trace, Non-fibrous 100%	221021702-02	No	NAD (by NYS ELAP 198.1) by Valeriu Voicu on 02/11/21
0208-TP-301-1 301 <b>Location:</b> Lime Storage Room - Quarry Tile Mortar  <b>Analyst Description:</b> Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Cellulose Trace, Non-fibrous 100%	221021702-03	No	NAD (by NYS ELAP 198.1) by Valeriu Voicu on 02/11/21
0208-TP-301-2 301 <b>Location:</b> Lime Storage Room - Quarry Tile Mortar  <b>Analyst Description:</b> Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Cellulose 0%, Non-fibrous 100%	221021702-04	No	NAD (by NYS ELAP 198.1) by Valeriu Voicu on 02/11/21
0208-TP-302-1 302 <b>Location:</b> Lime Storage Room - Quarry Tile Mud Bedding  <b>Analyst Description:</b> Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Cellulose Trace, Non-fibrous 100%	221021702-05	No	NAD (by NYS ELAP 198.1) by Valeriu Voicu on 02/11/21

# PLM Bulk Asbestos Report

2020-728; GHD; Erie County Water Authority, Waste Treatment  
 - 3750 River Road, Tonawanda, NY (Report Amended  
 2/19/2021)

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
0208-TP-302-2 302	221021702-06 <b>Location:</b> Lime Storage Room - Quarry Tile Mud Bedding	<b>No</b>	NAD (by NYS ELAP 198.1) by Valeriu Voicu on 02/11/21
<b>Analyst Description:</b> Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Cellulose Trace, Non-fibrous 100%			
0208-TP-500-1 500	221021702-07 <b>Location:</b> Exterior - Jacket Insulation Of CO2 Tank	<b>Yes</b>	10.8% (by NYS ELAP 198.6) by Valeriu Voicu on 02/11/21
<b>Analyst Description:</b> White/Black, Heterogeneous, Fibrous, Bulk Material <b>Asbestos Types:</b> Chrysotile 10.8 % <b>Other Material:</b> Non-fibrous 38%			
0208-TP-500-2 500	221021702-08 <b>Location:</b> Exterior - Jacket Insulation Of CO2 Tank		NA/PS
<b>Analyst Description:</b> Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b>			
0208-TP-500-3 500	221021702-09 <b>Location:</b> Exterior - Jacket Insulation Of CO2 Tank		NA/PS
<b>Analyst Description:</b> Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b>			
0208-TP-501-1 501	221021702-10 <b>Location:</b> Exterior - Tar Wrap On Pipes Inside CO2 Tank	<b>No</b>	NAD (by NYS ELAP 198.6) by Valeriu Voicu on 02/11/21
<b>Analyst Description:</b> White/Black, Heterogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 8.4%			
0208-TP-501-2 501	221021702-11 <b>Location:</b> Exterior - Tar Wrap On Pipes Inside CO2 Tank	<b>No</b>	NAD (by NYS ELAP 198.6) by Valeriu Voicu on 02/11/21
<b>Analyst Description:</b> White/Black, Heterogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 7.6%			

# PLM Bulk Asbestos Report

2020-728; GHD; Erie County Water Authority, Waste Treatment  
- 3750 River Road, Tonawanda, NY (Report Amended  
2/19/2021)

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
0208-TP-502-1 502	221021702-12	Yes	36.4% (by NYS ELAP 198.1) by Valeriu Voicu on 02/11/21
<b>Analyst Description:</b> Off-White, Homogeneous, Fibrous, Bulk Material <b>Asbestos Types:</b> Chrysotile 36.4 % <b>Other Material:</b> Synthetic fibers 50%, Non-fibrous 13.6%			
0208-TP-502-2 502	221021702-13		NA/PS
<b>Analyst Description:</b> Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b>			
0208-TP-600-1 600	221021702-14	Yes	6.6% (by NYS ELAP 198.6) by Valeriu Voicu on 02/11/21
<b>Analyst Description:</b> Tan/Green, Heterogeneous, Fibrous, Bulk Material <b>Asbestos Types:</b> Chrysotile 6.6 % <b>Other Material:</b> Non-fibrous 24.9%			
0208-TP-600-2 600	221021702-15		NA/PS
<b>Analyst Description:</b> Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b>			
0208-TP-601-1 601	221021702-16	No	NAD (by NYS ELAP 198.6) by Valeriu Voicu on 02/11/21
<b>Analyst Description:</b> Black, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 2.5%			
0208-TP-601-2 601	221021702-17	No	NAD (by NYS ELAP 198.6) by Valeriu Voicu on 02/11/21
<b>Analyst Description:</b> Black, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 2.9%			

# PLM Bulk Asbestos Report

2020-728; GHD; Erie County Water Authority, Waste Treatment  
- 3750 River Road, Tonawanda, NY (Report Amended  
2/19/2021)

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
0208-TP-602-1 602	221021702-18 <b>Location:</b> Sample Tank Room - Gaskets Of Piping	<b>No</b>	NAD (by NYS ELAP 198.1) by Valeriu Voicu on 02/11/21
<b>Analyst Description:</b> Off-White/Beige, Homogeneous, Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Cellulose 40%, Fibrous glass 5%, Non-fibrous 55%			
0208-TP-602-2 602	221021702-19 <b>Location:</b> Sample Tank Room - Gaskets Of Piping	<b>No</b>	NAD (by NYS ELAP 198.6) by Valeriu Voicu on 02/11/21
<b>Analyst Description:</b> Tan, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 1.5% <b>Comment:</b> Sample Submitted Appears to be NOB Material.			
0208-TP-602-3 602	221021702-20 <b>Location:</b> Pressure Pump Room - Gaskets Of Piping	<b>No</b>	NAD (by NYS ELAP 198.6) by Valeriu Voicu on 02/11/21
<b>Analyst Description:</b> Black, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 24.3% <b>Comment:</b> Sample Submitted Appears to be NOB Material.			
0208-TP-603-1 603	221021702-21 <b>Location:</b> Accordion Compactor - Woven Outer Layer Of Pipe Insulation	<b>Yes</b>	4.2% (by NYS ELAP 198.6) by Valeriu Voicu on 02/11/21
<b>Analyst Description:</b> Green/White, Homogeneous, Fibrous, Bulk Material <b>Asbestos Types:</b> Chrysotile 4.2 % <b>Other Material:</b> Non-fibrous 37.6%			
0208-TP-603-2 603	221021702-22 <b>Location:</b> Lime Slurry Room - Woven Outer Layer Of Pipe Insulation	<b>Yes</b>	4.3% (by NYS ELAP 198.6) by Valeriu Voicu on 02/19/21
<b>Analyst Description:</b> Off-White, Homogeneous, Fibrous, Bulk Material <b>Asbestos Types:</b> Chrysotile 4.3 % <b>Other Material:</b> Fibrous glass 2%, Non-fibrous 38.1%			

# PLM Bulk Asbestos Report

2020-728; GHD; Erie County Water Authority, Waste Treatment  
- 3750 River Road, Tonawanda, NY (Report Amended  
2/19/2021)

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
0208-TP-603-3 603	221021702-23	No	NAD
Location: Sample Tank Room - Woven Outer Layer Of Pipe Insulation			(by NYS ELAP 198.6) by Valeriu Voicu on 02/19/21
Analyst Description: White/Beige, Heterogeneous, Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Fibrous glass 20%, Wollastonite 20%, Non-fibrous 24.3%			
0208-TP-603-4 603	221021702-24	No	NAD
Location: Pressure Pump Room - Woven Outer Layer Of Pipe Insulation			(by NYS ELAP 198.6) by Valeriu Voicu on 02/19/21
Analyst Description: Beige/Tan, Heterogeneous, Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Fibrous glass 15%, Wollastonite 20%, Non-fibrous 21.4%			
0208-TP-604-1 604	221021702-25	No	NAD
Location: Accordion Compactor - Panels Of Accordion Compactor			(by NYS ELAP 198.6) by Valeriu Voicu on 02/11/21
Analyst Description: Beige, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 1.6%			
0208-TP-604-2 604	221021702-26	No	NAD
Location: Accordion Compactor - Panels Of Accordion Compactor			(by NYS ELAP 198.6) by Valeriu Voicu on 02/11/21
Analyst Description: Beige, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 0.7%			
0208-TP-606-1 606	221021702-27	No	NAD
Location: Electrical Panel In Blowdown - Covering On Inductor Coils			(by NYS ELAP 198.1) by Valeriu Voicu on 02/11/21
Analyst Description: Brown, Homogeneous, Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Cellulose 85%, Non-fibrous 15%			
0208-TP-606-2 606	221021702-28	No	NAD
Location: Electrical Panel In Blowdown - Covering On Inductor Coils			(by NYS ELAP 198.1) by Valeriu Voicu on 02/11/21
Analyst Description: Brown, Homogeneous, Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Cellulose 90%, Non-fibrous 10%			

Client Name: Stohl Environmental, LLC.

## PLM Bulk Asbestos Report

2020-728; GHD; Erie County Water Authority, Waste Treatment  
- 3750 River Road, Tonawanda, NY (Report Amended  
2/19/2021)

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### Reporting Notes:

Analyzed by: Valeriu Voicu  
Date: 2/11/2021



Reviewed by: Marik Peysakhov



\*NAD/NSD =no asbestos detected; NA =not analyzed; NA/PS=not analyzed/positive stop, (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; PLM Bulk Asbestos Analysis using Olympus, Model BH-2 Pol Scope, Microscope, Serial #: 229915, by Appd E to Subpt E, 40 CFR 763 (NVLAP 200546-0), ELAP PLM Method 198.1 for NY friable samples, which includes the identification and quantitation of vermiculite or ELAP 198.6 for NOB samples or EPA 400 pt ct by EPA 600-M4-82-020 (NY ELAP Lab 11480); Note:PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound 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 NY State (also see EPA Advisory for floor tile, FR 59,146,38970,8/1/94) National Institute of Standards and Technology Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the lab.This PLM report relates ONLY to the items tested. AIHA-LAP, LLC Lab ID 102843, RI Cert AAL-094, CT Cert PH-0186, Mass Cert AA000054, NJ Lab ID #NY031.

\_\_\_\_\_END OF REPORT\_\_\_\_\_



Table I  
Summary of Bulk Asbestos Analysis Results

2020-728; GHD; Erie County Water Authority, Waste Treatment - 3750 River Road, Tonawanda, NY (Report Amended 2/19/2021)

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	0208-TP-300-1	300	---	---	---	---	NAD	NA
Location:	Lime Storage Room - Quarry Tile Grout							
02	0208-TP-300-2	300	---	---	---	---	NAD	NA
Location:	Lime Storage Room - Quarry Tile Grout							
03	0208-TP-301-1	301	---	---	---	---	NAD	NA
Location:	Lime Storage Room - Quarry Tile Mortar							
04	0208-TP-301-2	301	---	---	---	---	NAD	NA
Location:	Lime Storage Room - Quarry Tile Mortar							
05	0208-TP-302-1	302	---	---	---	---	NAD	NA
Location:	Lime Storage Room - Quarry Tile Mud Bedding							
06	0208-TP-302-2	302	---	---	---	---	NAD	NA
Location:	Lime Storage Room - Quarry Tile Mud Bedding							
07	0208-TP-500-1	500	0.214	48.6	2.6	38.0	Chrysotile 10.8	NA
Location:	Exterior - Jacket Insulation Of CO2 Tank							
08	0208-TP-500-2	500	0.354	48.3	7.0	44.8	NA/PS	NA
Location:	Exterior - Jacket Insulation Of CO2 Tank							
09	0208-TP-500-3	500	0.157	47.6	4.6	47.8	NA/PS	NA
Location:	Exterior - Jacket Insulation Of CO2 Tank							
10	0208-TP-501-1	501	0.215	77.4	14.1	8.4	NAD	NAD
Location:	Exterior - Tar Wrap On Pipes Inside CO2 Tank							
11	0208-TP-501-2	501	0.220	77.7	14.7	7.6	NAD	NAD
Location:	Exterior - Tar Wrap On Pipes Inside CO2 Tank							
12	0208-TP-502-1	502	---	---	---	---	Chrysotile 36.4	NA
Location:	Electrical Panel In Blowdown - Wire Cloth Wrap							
13	0208-TP-502-2	502	---	---	---	---	NA/PS	NA
Location:	Electrical Panel In Blowdown - Wire Cloth Wrap							
14	0208-TP-600-1	600	0.247	59.5	9.0	24.9	Chrysotile 6.6	NA
Location:	Hoppers For Lime Storage - Caulk At Duct Seams							
15	0208-TP-600-2	600	0.189	59.9	9.5	30.6	NA/PS	NA
Location:	Hoppers For Lime Storage - Caulk At Duct Seams							
16	0208-TP-601-1	601	0.199	85.5	12.0	2.5	NAD	NAD
Location:	Hoppers For Lime Storage - Gasket At Hatches							

Table I  
Summary of Bulk Asbestos Analysis Results

2020-728; GHD; Erie County Water Authority, Waste Treatment - 3750 River Road, Tonawanda, NY (Report Amended 2/19/2021)

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	0208-TP-601-2	601	0.164	85.8	11.2	2.9	NAD	NAD
Location:	Sludge Retention Tank - Gasket/At Hatches							
18	0208-TP-602-1	602	----	----	----	----	NAD	NA
Location:	Sample Tank Room - Gaskets Of Piping							
19	0208-TP-602-2	602	0.247	64.8	33.8	1.5	NAD	NAD
Location:	Sample Tank Room - Gaskets Of Piping							
20	0208-TP-602-3	602	0.155	57.2	18.5	24.3	NAD	NAD
Location:	Pressure Pump Room - Gaskets Of Piping							
21	0208-TP-603-1	603	0.177	48.7	9.5	37.6	Chrysotile 4.2	NA
Location:	Accordion Compactor - Woven Outer Layer Of Pipe Insulation							
22	0208-TP-603-2	603	0.145	40.8	14.7	40.1	Chrysotile 4.3	NA
Location:	Lime Slurry Room - Woven Outer Layer Of Pipe Insulation							
23	0208-TP-603-3	603	0.085	23.9	11.8	64.3	NAD	NAD
Location:	Sample Tank Room - Woven Outer Layer Of Pipe Insulation							
24	0208-TP-603-4	603	0.206	30.3	13.3	56.4	NAD	NAD
Location:	Pressure Pump Room - Woven Outer Layer Of Pipe Insulation							
25	0208-TP-604-1	604	0.110	96.8	1.6	1.6	NAD	NAD
Location:	Accordion Compactor - Panels Of Accordion Compactor							
26	0208-TP-604-2	604	0.140	98.6	0.6	0.7	NAD	NAD
Location:	Accordion Compactor - Panels Of Accordion Compactor							
27	0208-TP-606-1	606	----	----	----	----	NAD	NA
Location:	Electrical Panel In Blowdown - Covering On Inductor Coils							
28	0208-TP-606-2	606	----	----	----	----	NAD	NA
Location:	Electrical Panel In Blowdown - Covering On Inductor Coils							

Client Name: Stohl Environmental, LLC.

Table I  
Summary of Bulk Asbestos Analysis Results

2020-728; GHD; Erie County Water Authority, Waste Treatment - 3750 River Road, Tonawanda, NY (Report Amended 2/19/2021)

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
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Analyzed by: Gabriella Morozov  
Date: 2/12/2021



Reviewed by: Marik Peysakhov



\*\*Quantitative Analysis (Semi/Full); Bulk Asbestos Analysis - PLM by Appd E to Subpt E, 40 CFR 763 or NYSDOH ELAP 198.1 for New York friable samples or NYSDOH ELAP 198.6 for New York NOB samples; TEM (Semi/Full) by EPA 600/R-93/116 (or NYSDOH ELAP 198.4; for New York samples). Analysis using Hitachi, Model H7000-Noran 7 System, Microscope, Serial #: 747-05-06. NAD = no asbestos detected during a quantitative analysis; NA = not analyzed; Trace = <1%; (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; Quantitation for beginning weights of <0.1 grams should be considered as qualitative only; Qualitative Analysis: Asbestos analysis results of "Present" or "NVA = No Visible Asbestos" represents results for Qualitative PLM or TEM Analysis only (no accreditation coverage available from any regulatory agency for qualitative analyses): NVLAP (PLM) 200546-0, NYSDOH ELAP Lab 11480, AIHA-LAP, LLC (PLM) Lab ID 102843, NJ Lab ID #NY031.

Warning Note: PLM 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 for which PLM evaluation is recommended (i.e. soils and other heterogeneous materials).





3860 California Road, Orchard Park, New York 14127  
PHONE (716) 312-0070 FAX (716) 312-8092  
WWW.STOHLENVIRONMENTAL.COM

## Chain of Custody Document

Submitted to: (Lab Name)

AmeriSci - NY

STOHL Job #

2020-728

Client: GHD

Contact:

Building: Erie County Water Authority - Waste Treatment

Location: 3750 River Road, Tonawanda, NY

### LEAD

Wipes

Soil:

Bulk:

### PCB's

EPA 8082

RUSH

Hr

### Turnaround

☐ 24 Hour

☒ 72 Hour

☐ 48 Hour

☐ 5 Day

\*ASTM wipes were used\*

HAN #	Material Description	Sample #	Location of Sample
300	Quarry Tile - Grout	0208-TP-300- 1	Lime Storage Room
300	Quarry Tile - Grout	0208-TP-300- 2	Lime Storage Room
301	Quarry Tile - Mortar	0208-TP-301- 1	Lime Storage Room
301	Quarry Tile - Mortar	0208-TP-301- 2	Lime Storage Room
302	Quarry Tile - Mud Bedding	0208-TP-302- 1	Lime Storage Room
302	Quarry Tile - Mud Bedding	0208-TP-302- 2	Lime Storage Room
500	Jacket Insulation of CO2 Tank	0208-TP-500- 1	Exterior
500	Jacket Insulation of CO2 Tank	0208-TP-500- 2	Exterior
500	Jacket Insulation of CO2 Tank	0208-TP-500- 3	Exterior
501	Tar Wrap on Pipes inside CO2 Tank	0208-TP-501- 1	Exterior
501	Tar Wrap on Pipes inside CO2 Tank	0208-TP-501- 2	Exterior
502	Wire Cloth Wrap	0208-TP-502- 1	Electrical Panel in Blowdown
502	Wire Cloth Wrap	0208-TP-502- 2	Electrical Panel in Blowdown
600	Caulk at Duct Seams	0208-TP-600- 1	Hoppers for Lime Storage
600	Caulk at Duct Seams	0208-TP-600- 2	Hoppers for Lime Storage
601	Gasket at Hatches	0208-TP-601- 1	Hoppers for Lime Storage
601	Gasket at Hatches	0208-TP-601- 2	Sludge Retention Tank
602	Gaskets of Piping	0208-TP-602- 1	Sample Tank Room
602	Gaskets of Piping	0208-TP-602- 2	Sample Tank Room
602	Gaskets of Piping	0208-TP-602- 3	Pressure Pump Room
603	Woven Outer Layer of Pipe Insulation	0208-TP-603- 1	Accordion Compactor
603	Woven Outer Layer of Pipe Insulation	0208-TP-603- 2	Lime Slurry Room
603	Woven Outer Layer of Pipe Insulation	0208-TP-603- 3	Sample Tank Room
603	Woven Outer Layer of Pipe Insulation	0208-TP-603- 4	Pressure Pump Room
604	Panels of Accordion Compactor	0208-TP-604- 1	Accordion Compactor
604	Panels of Accordion Compactor	0208-TP-604- 2	Accordion Compactor
606	Covering on Inductor Coils	0208-TP-606- 1	Electrical Panel in Blowdown

Note 1: Stop at first positive for homogeneous materials. Perform full NYS ELAP PLM/TEM Protocol for all samples.

Notes:

Please e-mail lab results to labs@stohlenv.com

☒ If checked, also e-mail results to: shanley@stohlenvironmental.com

Sampled By:

Print Name

Sean Hanley

Date: 2/8/2021

Relinquished By:

Print Name

Sean Hanley

Date: 2/9/2021

Received By:

Print Name

Kathryn Byrne

Date:

2/10/21 1120

221021702#





## Submitted to: (Lab Name) AmeriSci - NY

AmeriSci - NY

STOHL Job # 2020-728

2020-728

Client: GHD

**Contact:** \_\_\_\_\_

Building: Erie County Water Authority - Waste Treatment

Location: 3750 River Road, Tonawanda, NY

**LEAD**

Wipes                      Soil:                      Bulk:

## PCB's

EPA 8082

RUSH Hr

*Tumaround*

☐ 24 Hour    ☒ 72 Hour

☐ 48 Hour    ☐ 5 Day

\*ASTM wipes were used\*

Note 1: Stop at first positive for homogeneous materials. Perform full NYS ELAP PLM/TEM Protocol for all samples.

Notes:

Please e-mail lab results to [labs@stohlenv.com](mailto:labs@stohlenv.com) ☒ If checked, also e-mail results to: [shanley@stohlenvironmental.com](mailto:shanley@stohlenvironmental.com)

Please e-mail lab results to [labs@stohlenv.com](mailto:labs@stohlenv.com)

☒ If checked, also e-mail results to: [shanley@stohlenvironmental.com](mailto:shanley@stohlenvironmental.com)

Sampled By: Sean Hanley Print Name Sean Hanley Date: 2/8/2021

Relinquished By: [Signature] Print Name: Sean Hanley Date: 2/9/2021

Received By: [Signature] Date: 2/10/21 11210

Stohl Env Bulk Sample Chain of Custody v4.4

Page 2 of 2

22 1 0 2 1 7 0 2 #