

Set No: 18

# Project Manual

## Contract No.: OBG-12A

### Sturgeon Point and Van De Water Improvements Project

Project No. 201500169

September 2016

*Files*

Contract 17-01-01

Budget Item #

E.C. #

Orders - Bond Issue #

O.W.I.P. #

Expense #

## Erie County Water Authority

295 Main Street, Room 350  
Buffalo, New York 14203





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

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**CONTRACT No: OBG-12A  
STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT**

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**ECWA PROJECT No: 201500169**

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**SEPTEMBER 2016**

**This Project Manual and Contract Drawings were prepared under the direct supervision of  
a Professional Engineer by: O'Brien & Gere Engineers**



**ERIE COUNTY WATER AUTHORITY  
295 Main Street, Room 350  
Buffalo, New York 14203**

#18

**ADDENDUM NO. 1**

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**OCTOBER 24, 2016**

**CONTRACT OBG-12A**

**STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT**

**PROJECT NO. 201500169**

**ERIE COUNTY WATER AUTHORITY**

THE ATTENTION OF ALL BIDDERS IS DIRECTED TO THE FOLLOWING CHANGES TO THE CONTRACT DOCUMENTS:

**A. PROJECT MANUAL**

1. In the Notice to Bidders, in the first sentence, DELETE "The Erie County Water Authority will receive separate, sealed bids for the furnishing of all labor, plant, tools, equipment and specified materials, etc." and SUBSTITUTE THEREFOR "The Erie County Water Authority will receive sealed bids for the furnishing of all labor, plant, tools, equipment and specified materials, etc."
2. In the Notice to Bidders, in the second paragraph, DELETE "Bids will be received by the Erie County Water Authority until 11:00 a.m. prevailing time, on Tuesday, October 25, 2016 at the Cashier's Office of the Authority, 295 Main Street, Room 350, Buffalo, New York 14203, and then at that time and place will be publicly opened and read" and SUBSTITUTE THEREFOR "Bids will be received by the Erie County Water Authority until 11:45 a.m. prevailing time, on Tuesday, November 1, 2016 at the Cashier's Office of the Authority, 295 Main Street, Room 350, Buffalo, New York 14203, and then at that time and place will be publicly opened and read".
3. In the Supplementary Conditions, in Article SC-4.02, DELETE the sentence "Copies of the applicable reports and drawings listed above are included in the supplemental information." and SUBSTITUTE THEREFOR "Copies of the applicable reports and drawings listed above are available for review upon request from the ENGINEER."
4. In Section 01 11 00, Summary of Work, Paragraph 1.4.A, ADD the following:  
"3. Draining and flushing the chemical tanks and chemical lines indicated for demolition in the Contract Documents, upon notification from the CONTRACTOR."
5. ADD Section 03 30 00, Cast-in-Place Concrete, a copy of which is attached hereto and made part of this addendum.



6. ADD Section 03 93 00, Concrete Rehabilitation, a copy of which is attached hereto and made part of this addendum.
7. ADD Section 05 50 00, Metal Fabrications, a copy of which is attached hereto and made part of this addendum.
8. ADD Section 05 51 00, Metal Stairs, a copy of which is attached hereto and made part of this addendum.
9. ADD Section 05 52 13, Pipe and Tube Railings, a copy of which is attached hereto and made part of this addendum.
10. ADD Section 05 53 00, Metal Gratings, a copy of which is attached hereto and made part of this addendum.
11. In Section 40 05 10, Interior Process Piping Systems, Paragraph 2.1, ADD the following:
  - “G. Drip Tray
    1. Drip trays shall be constructed of modular sections of fiberglass reinforced polyester resin compatible with the chemical being conveyed.
    2. Appropriate drip tray fittings and transitions shall be utilized to facilitate routing of the drip tray to designated locations.
    3. Side walls of the drip tray shall be such that the sidewall height is at least 1-inch greater than the outside diameter of the largest pipe located in the tray when mounted on channel struts
    4. Width of the drip tray shall permit at least 1-inch of clearance between process pipes and side walls for piping installed in the drip tray.
    5. Drip trays shall be of uniform thickness, have smooth edges, and corners, and be outfitted with snap-on gasketed removable covers providing a watertight fit.
    6. Body splice plates shall be supplied with 316-stainless steel hardware with gasketed backed washers that are compatible with the chemicals being conveyed to prevent seepage of chemicals being conveyed from the drip tray.
    7. Fiberglass reinforced channel struts shall be secured to the drip tray using 316-stainless steel hardware with gasketed backed washers that are compatible with the chemicals being conveyed to prevent seepage of chemicals being conveyed from the drip tray.



8. Routing of the drip tray shall permit any leakage that occurs in the tray to drain to the curbed containment area located in the Chemical Control Area. Drip trays shall be installed per manufacturer's specifications.
9. Manufacturer:
  - a. Enduro Composites."
12. In Section 40 05 56, Misc. Valves and Traps, DELETE Paragraph 2.3.H in its entirety.
13. DELETE Section 40 95 14, PLC Control System Coordination (pages 40 95 14 -1 thru 40 95 14-3) in its entirety and SUBSTITUTE THEREFOR with Section 40 95 14, a copy of which is attached hereto and made part of this Addendum.
14. DELETE Section 46 33 48, Installation of Sludge Analyzers, in its entirety and SUBSTITUTE THEREFOR 46 33 48, a copy of which is attached hereto and made part of this Addendum.
15. Meeting minutes from the Pre-Bid Meeting for this Project are included in Addendum No. 1, a copy of which is attached hereto and made part of this Addendum.

**B. CONTRACT DRAWINGS**

1. On Drawing M-201 (File No. 4424.61988-227, dated 09/27/16), ADD the following to the drawing notes:

"5. Work associated with the Sludge Collector Repairs shall be performed within the Coagulation Basins in accordance with the manufacturer's recommendations."
2. On Drawing M-203 (File No. 4424.61988-229, dated 09/27/16), DELETE Note 3 in its entirety and SUBSTITUTE THEREFOR "Baffle Wall Repairs, if needed, will be determined during site inspections and addressed through Payment Item 8."
3. On Drawing M-205 (File No. 4424.61988-263, dated 09/27/16), in Note 3, ADD "Refer to Section 46 33 42 entitled "Installation of Sludge Analyzers"."
4. On Drawing M-205 (File No. 4424.61988-263, dated 09/27/16), in Note 4, ADD "Refer to Section 46 33 42 entitled "Installation of Sludge Analyzers"."
5. On Drawing M-205 (File No. 4424.61988-263, dated 09/27/16), DELETE the label "Concrete core for sludge analyzer. Location and size to be verified by Owner during construction. See sludge measurement detail on Sheet M-207." And SUBSTITUTE THEREFOR "Concrete core for sludge analyzer. Location and size to be verified by Owner during construction. See sludge measurement detail on Sheet M-207. See Notes 3 and 4."



6. On Drawing M-205 (File No. 4424.61988-263, dated 09/27/16), DELETE Note 1 in its entirety and SUBSTITUTE THEREFOR the following:

“1. Contractor shall be responsible for removing sludge build-up in the Coagulation Basin Influent Channel in accordance with the following:

- Assume the Coagulation Basin Influent Channel to be 25% filled with sludge, along the entire width of the channel and for approximately 300 ft. in length.
- Coagulation Basin Influent Channel is approximately 4’8” wide x 7’ tall.
- Coagulation Basin Influent Channel can be accessed from the Flash Mixers in the Control Building or through the 24’ x 24” sluice gates in the Flocculation Compartment of the Coagulation Basins (5 per basin).
- Solids within the Coagulation Basin Influent Channel shall be conveyed to the Flash Mixers in the Control Building. Contractor shall remove the solids from the Flash Mixers and transfer them to the coagulant side of the Wastewater Pumping Station Basin or another location on-site approved by the Owner. Analytical testing or further disposal of the solids is not necessary.
- Coagulation Basin No. 1 and No. 2 will be taken offline during the sludge removal process. The duration of the sludge removal process shall be a maximum of 5 days.
- The slide gate that separates the 7’ x 4’8” Influent Channel feeding Coagulation Basin Nos. 1 and 2 and the 60” Treated Water Conduit feeding Coagulation Basin Nos. 3,4 and 5 will be closed during the sludge removal process.
- If water removal is necessary, Contractor shall be responsible for furnishing and maintaining pumps, sumps, suction and discharge piping systems and other system components necessary to convey water.”

7. On Drawing M-205 (File No. 4424.61988-263, dated 09/27/16), ADD the following:

“5. The superimposed live load on the roof of the Coagulation Basins shall not exceed 160 lbs/ft<sup>2</sup>.”

8. On Drawing M-206 (File No. 4424.61988-231, dated 09/27/16), ADD the following:

“DRAWING NOTES:

1. Vendor Representative for Nordic Water is WesTech, 3665 West Temple, Salt Lake City, Utah 84115, Phone 801-290-1448.”

9. On Drawing M-302 (File No. 4424.61988-233, dated 09/27/16), in the Notes, ADD the following:

“12. Clean the floor surface in the Potassium Permanganate Containment Area in preparation for application of coating system. Return system to smooth finish with Tnemec Series 215 surfacing epoxy or approved equal. Coat floor and 6” high concrete curbing in Potassium Permanganate Containment Area with Tnemec



equal.”

10. On Drawing P-001 (File No. 4424.61988-276, dated 09/27/16), DELETE Drawing Note Nos. 15, 16, 17 and 18 in their entirety.

11. On Drawing P-301 (File No. 4424.61988-278, dated 09/27/16), in the General Notes, ADD the following:

“E. Provide ball valves on all water piping 3 inches and smaller, as specified. Provide gate valves on all water piping 4 inches and larger, as specified. Valves shall be provided in accordance with Section 22 05 23.”

12. On Drawing P-303 (File No. 4424.61988-280, dated 09/27/16), ADD the following:

“GENERAL NOTES:

1. Provide ball valves on all water piping 3 inches and smaller, as specified. Provide gate valves on all water piping 4 inches and larger, as specified. Valves shall be provided in accordance with Section 22 05 23.”

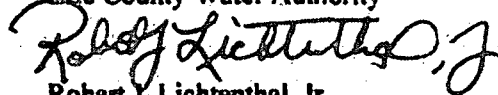
13. On Drawing P-304 (File No. 4424.61988-288, dated 09/27/16), ADD the following:

“GENERAL NOTES:

1. Provide ball valves on all water piping 3 inches and smaller, as specified. Provide gate valves on all water piping 4 inches and larger, as specified. Valves shall be provided in accordance with Section 22 05 23.”

**SPECIAL NOTICE:** This Addendum shall be inserted in the Contract Documents submitted with the Bid and shall be signed by the Bidder in the space provided.

Erie County Water Authority



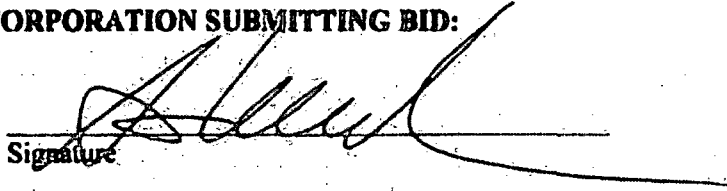
Robert J. Lichtenthal, Jr.

Assistant Secretary to the Authority

**SIGNATURE OF PERSON, FIRM OR CORPORATION SUBMITTING BID:**

(Seal if bid by corporation)

Signature

Scot Hirschman, President

Title





Attachments

1. Pre-Bid Meeting Minutes
2. Section 03 30 00, Cast-in-Place Concrete (pages 03 30 00-1 thru 03 30 00-13)
3. Section 03 93 00, Concrete Rehabilitation (pages 03 93 00-1 thru 03 93 00-7)
4. Section 05 50 00, Metal Fabrications (pages 05 50 00-1 thru 05 50 00-3)
5. Section 05 51 00, Metal Stairs (pages 05 51 00-1 thru 05 51 00-4)
6. Section 05 52 13, Pipe and Tube Railings (pages 05 52 13-1 thru 05 52 13-8)
7. Section 05 53 00, Metal Gratings (pages 05 53 00-1 thru 05 53 00-6)
8. Section 40 95 14, PLC Control System Coordination (pages 40 95 14 -1 thru 40 95 14-3)
9. Section 46 33 48, Installation of Sludge Analyzers (pages 46 33 48-1 thru 46 33 48-2)



<b>PROJECT</b>	Sturgeon Point and Van De Water Improvements Project
<b>PURPOSE</b>	Pre-Bid Meeting
<b>DATE</b>	Wednesday October 12, 2016
<b>TIME</b>	10:00 a.m.
<b>OBG FILE</b>	04424 / 61988/ Docs/ Bid Phase

## SIGN IN

## INTRODUCTION

- Project Team
  - » Michael Manning, O'Brien & Gere (Project Manager)
  - » Michelle McEntire, O'Brien & Gere (Lead Process-Mechanical Engineer)
  - » Jim Raleigh, O'Brien & Gere (Resident Inspector)
  - » Peter Gallivan, M/E Engineering (Plumbing Engineer)

## PURPOSE OF THE MEETING

- The purpose of the Pre-Bid Meeting is to review the general scope of work and requirements of the Contract Documents.
- The meeting discussion is considered informal in nature and is not intended to alter the intent or meaning of the Contract Documents.
- A site visit to the Filter Building, Control Building, Delivered Water Pumping Station and Coagulation Basins will immediately follow the Pre-Bid Meeting.
- Meeting minutes from the Pre-Bid Meeting will be issued by addendum. Meeting minutes will include questions asked at the Pre-Bid Meeting.

## PROJECT DESCRIPTION

- The project consists of one (1) Prime Contract and generally involves the following components:
  - » Construction within the Coagulation Basins, including baffle wall modifications, slide gate and access hatch installation, repair of the Super Scraper Assemblies and valve replacement.
  - » Chemical System improvements, including a new filter aid air compressor system, caustic pump replacement, potassium permanganate system improvements, and fluoride system improvements.
  - » Separation of potable water systems from non-potable water systems at the WTP.
  - » Replacement of the heating and ventilating system in the Fluoride Room.
  - » Miscellaneous structural and electrical modifications and miscellaneous painting.

**CONTRACT REQUIREMENTS**

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***Sealed Proposals (00100-1)***

- Bids will be received by the Erie County Water Authority until 11:00 a.m. on Tuesday, October 25, 2016 at the Cashier's Office of the Authority, 295 Main Street, Room 350, Buffalo, NY 14203.

***Obtaining Contract Documents (00100-2)***

- Contract Documents may be obtained from the Cashier's Office, phone (716) 849-8484, upon payment of a deposit of \$50. Checks for documents shall be made payable to Erie County Water Authority.
- Contract Documents are also available by mail from the Engineer. The Engineer will mail the Contract Documents upon receipt of the \$50 deposit plus a non-refundable mailing and handling charge of \$25.

***Proposed Bidder questions (00100-2)***

- All questions about meaning or intent of the bidding documents shall be submitted in writing to Michelle L. McEntire, PE. Contact information, including e-mail address, is included in the Contract Documents.

***Addenda (00200-6)***

- Questions must be received by the Engineer at least ten (10) days prior to the Bid Opening. The last day for questions is this Friday, October 14<sup>th</sup>.

***Bid Security (00200-7)***

- A Bid must be accompanied by a Bid security made payable to the OWNER in the amount of 5% of the Bidder's maximum Bid price and in the form of a certified check or Bid Bond.
- The Bid Bond shall be on the form bound in the Project Manual.

***Preparation of Bid (00200-9)***

- 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.
- All blanks in the Bid Form shall be completed. In case of discrepancy between the words and the numbers, the words shall govern.
- The Bid shall contain an acknowledgement of the receipt of all Addenda in the space provided on the Bid form.
- Documents listed in the Instructions to Bidders, Paragraph 15.06, which are bound in the Project Manual, shall be submitted with the Bid and shall be executed in the manner described in this Article.

***Award of Contract (00200-13)***

- The 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.
- The OWNER reserves the right to reject any Bid not accompanied by the specified documentation and Bid security.
- The 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.

***Project Schedule (00500-2)***

- The Work shall be substantially completed within 280 days after the date when Contract Times commence to run.

- The Work shall be completed and ready for final payment within 315 days from the date when Contract Times commence to run.

**Liquidated Damages**

- The Contractor shall pay the OWNER \$500 for each day that expires after the time specified for Substantial Completion.

**Reference Drawings (00800-1)**

- Existing drawings were used by the ENGINEER during the design. Copies of the reports and drawings referenced in the Supplementary Conditions will be made available upon request to the ENGINEER.

**Insurance Requirements (00800-2)**

- Contractor shall procure and maintain insurance in accordance with the requirements included in Appendix B.

**Sales Tax (00800-3)**

- The OWNER is exempt from sales tax on all materials incorporated into the Work.
- Exemption on sales tax does not apply to construction tools, machinery, equipment, or other property purchased by or leased by the CONTRACTOR, or to supplies or materials not incorporated into the Work.

**W/MBE Requirements (00800-8)**

- W/MBE participation requirements are included in Appendix A.

**Allowances (01 21 00-2)**

- A \$250,000 contingency allowance is included in the Bid for Payment Item 8, Miscellaneous Improvements Allowance.
- A \$75,000 cash allowance is included in the Bid for Payment Item 9, Security Allowance.
- A \$125,000 cash allowance is included in the Bid for Payment Item 11, Control System Integration Allowance.
- A \$30,000 cash allowance is included in the Bid for Payment Item 12, Potassium Permanganate Pump Allowance.

**Measurement and Payment (01 22 13-1)**

- Note that Payment Item Nos. 2 and 10 are not being used.

**Sequence of Work (01 31 13-2)**

- The Work is being completed at an existing facility. Work shall be constructed without disruption to the normal operations of the OWNER, except as noted in this Section or approved by the OWNER.
- The sequence of Work described in Section 01 31 13 is not intended to dictate the CONTRACTOR's means and methods.
- The CONTRACTOR may submit an alternate sequence of Work to the ENGINEER for review. The CONTRACTOR may not proceed with completion of the Work in an alternate sequence without receiving written approval from the ENGINEER.

**Substitutions (01 25 00-1)**

- Substitutions for Cause - The ENGINEER will consider written requests from the CONTRACTOR for substitution of products, manufacturers and/or construction methods (if specified) during a period of 30 days after commencement of the Contract Time.

- Substitutions for Convenience - The ENGINEER will consider written requests from the CONTRACTOR for substitution of products, manufacturers and/or construction methods (if specified) during a period of 60 days after the Notice of Award.

## QUESTIONS

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- Will the chemical lines be flushed prior to the demolition work?
  - » Section 01 11 00, Summary of Work, was modified via Addendum No. 1. Owner will be responsible for flushing the chemical lines.
- Will the chemical tanks be drained and flushed prior to the demolition work?
  - » Section 01 11 00, Summary of Work, was modified via Addendum No. 1. Owner will be responsible for draining and flushing the chemical tanks.
- What are the limits of painting in the Fluoride Room?
  - » Drawing M-302, Note 9 provides information on the limits of painting in the Fluoride Room.
- Where is the access point for the Coagulation Basin Influent Channel that needs to be cleaned as part of this project?
  - » Access to the Coagulation Basin Influent Channel is from the Flash Mixers in the Control Building or the 24" x 24" slide gates in Flocculation Compartment of the Coagulation Basins (i.e. from either end of the channel).

**STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT - ATTENDANCE LIST**

**ATTENDANCE LIST**

Owner: Erie County Water Authority  
 Project: Sturgeon Point and Van De Water Improvements Project  
 Contract No: OBG-12A  
 Date: Wednesday, October 12, 2016  
 Time: 10:00 a.m.  
 Place: Sturgeon Point WTP, 722 Sturgeon Point Road, Derby, NY  
 Purpose: Pre-Bid Meeting

Name	Affiliation	Phone	E-mail
Chris Wall	O'Connell	(585) 202-6406	Chris.wall@oconnellelectnc.com
JOEL HIRSCHMAN	H-K SERVICES	(716) 296-5290	JHIRSCHMAN@H-KSERVICES.COM
Norm Hartman	CIR	(716) 362-5000	gnjakubowski@ciirelectric.com
ADRIAN BUNCKENWASIT	BUNCKENWASIT CO. INC.	716 - 261 - 7290	adriank@bunckenc.com
TOM FERRICCI	IDEAL CONCRETE INC.	716 893 6122	tom@idealconcreteinc.com
Chuck Krepper	STC	716-592-3400	CKREPPER@BUTLERSTE.COM
CAMERON MCLAUREN	STC	716-592-3400	CMCLAUREN@BUTLERSTE.COM
Rob Emmerson	PPG	585 303 7257	robert.emmerson@ppg.com
PETER GALLIVAN	M/E ENGINEERING, PC	(716) 845-5292	PWGALLIVAN@MEENGINEERING.COM
Tim Ryleigh	OBG	716 652 4090	tryleigh12007@gmail.com
Len Kowalski	ECWA	716-685-8220	LKowalski@ECWA.ORG
JASON RICE	STC CONST.	716-592-3400	jrice@butlerstc.com
MARTIN CHIAPPA	Niagara Castings	716-297-5334	mchiappa@niagara-castings.com

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**SECTION 03 30 00**  
**CAST-IN-PLACE CONCRETE**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, waterstops, mixture design, placement procedures, and finishes, for the following:
1. Concrete toppings
  2. Concrete equipment pads.
  3. Concrete curbs.

**1.2 REFERENCES**

- A. Building Code of New York State (BCNYS), 2010
- B. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:
1. American Concrete Institute (ACI)
  2. American National Standards Institute (ANSI)
  3. American Society for Testing and Materials (ASTM)
  4. Concrete Reinforcing Steel Institute (CRSI)

**1.3 DEFINITIONS**

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

**1.4 SUBMITTALS**

- A. Submit the following in accordance with the General Requirements.
1. Scheduling: Submit concrete placement schedule before start of placement operations. Include locations of all joints including construction joints.
  2. Product data for each type of manufactured material and product indicated, including reinforcement and forming accessories, admixtures, patching compounds, joint systems, dry-shake finish materials, fiber reinforcement, curing materials, floor and slab treatments, bonding agents and others, if requested by Owner's Representative.
  3. Written mix design shall be based on field experience or trial mixture. Submit documentation in accordance with ACI 301, Section 3.9
    - a. Indicate amounts of mixing water to be withheld for later addition at Project site.
  4. Shop drawings for detailing, fabricating, bending, and placing concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, bent bar diagrams, arrangement, and support of concrete reinforcement. Include special reinforcing required for openings through concrete structures.





## 1.5 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. **Testing Agency Qualifications:** An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
  - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
  - 2. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- C. **ACI Publications:** Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301, "Specification for Structural Concrete"
- D. **Concrete Testing Service:** Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures. Coordinate the material evaluation testing with the Owner's Special Inspection program.
- E. **Pre-installation Conference:** Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management And Coordination."
  - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete manufacturer.
    - d. Cast-in-place concrete subcontractor.
  - 2. Review concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, forms and form-removal limitations, reinforcement accessory installation, concrete repair procedures, and protection of cast-in-place concrete.
- F. **Qualifications**
  - 1. **Manufacturer's Factory Qualifications:** Manufacturing facilities shall have accreditation to ISO 9000:2000 or an equivalent quality management system acceptable to the Engineer.
  - 2. **Testing Firm Qualifications:** An independent firm, with experience and capability to conduct specified tests, and is a member company of NETA or is an NRTL as defined by OSHA in 19 CFR 1910.7
  - 3. **Testing Firm's Field Supervisor Qualifications:** person currently certified by NETA or NICET to supervise on-site testing specified in Part 3.



**1.6 DELIVERY, STORAGE AND HANDLING**

- A. Deliver, store and handle steel reinforcement to prevent bending and damage.
- B. The acceptability of steel reinforcement with rust, mill scale or a combination of both shall be determined based on the provisions of ACI 318 and applicable ASTM specifications.
- C. Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

**PART 2 - PRODUCTS**

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**2.1 FORM-FACING MATERIALS**

- A. General: Comply with Division 03 Section "Cast-In-Place Concrete" for formwork and other form-facing material requirements.
- B. Form-Facing Panels for As-Cast Finishes: Steel, glass-fiber-reinforced plastic or other approved nonabsorptive panel materials that will provide continuous, true, and smooth concrete surfaces, medium-density overlay, Class 1, or better, mill-applied release agent and edge sealed, complying with DOC PS 1.
- C. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
- D. Form Liners: Units of face design, texture, arrangement, and configuration [indicated] [to match design reference sample]. Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent surface treatments of concrete.
- E. Rustication Strips: Metal, rigid plastic or dressed wood with sides beveled and back kerfed; nonstaining; in longest practicable lengths.
- F. Chamfer Strips: Metal, rigid plastic, elastomeric rubber, or dressed wood, 3/4 by 3/4 inch (19 by 19 mm), minimum; nonstaining; in longest practicable lengths.
- G. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800, "Specification 810.1, Expanded Cellular Glazing Tape"; minimum 1/4 inch (6 mm) thick.
- H. Form Joint Sealant: Elastomeric sealant complying with ASTM C 920, Type M or S, Grade NS that adheres to form joint substrates.
- I. Sealer: Penetrating, clear, polyurethane wood form sealer formulated to reduce absorption of bleed water and prevent migration of set-retarding chemicals from wood.
- J. Form-Release Agent: Commercially formulated colorless form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of those surfaces.
  - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- K. Surface Retarder: Chemical liquid set retarder, for application on form-facing materials, capable of temporarily delaying final hardening of newly placed concrete surface to depth of reveal specified.
- L. Form Ties: Factory-fabricated, snap-off or removable metal ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
  - 1. Furnish ties that, when removed, will leave holes 1 inch (25 mm) in diameter on



concrete surface.

2. Furnish internally disconnecting ties that will leave no metal closer than 1-1/2 inches (38 mm) from the concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

## 2.2 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
  1. Portland Cement: ASTM C 150, Type I/II, gray. Supplement with the following:
  2. Fly Ash: ASTM C 618, Class F.
  3. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
  4. Silica Fume: ASTM C 1240, amorphous silica.
- B. Normal-Weight Aggregates: ASTM C 33, Class 5S coarse aggregate or better, graded. Provide aggregates from a single source.
  1. Maximum Coarse Aggregate Size: 1 1/2 inch (25 mm) typical or 3/4" for concrete toppings.
  2. Gradation: Uniformly graded.
- C. Normal-Weight Fine Aggregate: ASTM C 33, manufactured or natural sand, from same source for entire Project.
- D. Water: Potable, complying with ASTM C 94/C 94M except free of wash water from mixer washout operations.

## 2.3 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260. Do not use air entrainment for interior concrete slabs to receive a trowel finish.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- C. Crystalline waterproofing admixture for use in concrete elements where indicated on the Contract Drawings shall meet the following requirements:
  1. Permeability: concrete treated with admixture shall resist a water pressure of 150 psi with no measurable leakage.
  2. Provide admixture at the dosage prescribed by the manufacturer.
  3. Acceptable Products:
    - a. Penetron Admix by Penetron



- b. XYPEX Admix C-500 or C-1000 as appropriate for constituents of concrete mixture by XYPEX Chemical Corporation
- c. Krystol Internal Membrane by Kryton International Inc.

## 2.4 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
  - 1. Curing compound is not permitted for flatwork.
  - 2. For concrete indicated to be sealed, curing compound shall be compatible with sealer.

## 2.5 BONDING MATERIALS

- A. Bonding Agent: ASTM C 1059, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements.

## 2.6 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of cast-in-place concrete proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI 301.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed design mixtures based on laboratory trial mixtures.
- B. Proportion concrete mixtures as follows:
  - 1. Compressive Strength (28 Days): 4000 psi (27.6 MPa)
  - 2. Maximum Water-Cementitious Materials Ratio: 0.45
  - 3. Slump Limit: 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture.
  - 4. Air Content: 4-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-inch (38-mm) nominal maximum aggregate size.
- C. Cementitious Materials: For cast-in-place concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301, 318 and 350 requirements. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Follow manufacturer's strict instructions for addition of crystalline waterproofing admixture during the batching process.



## 2.7 CONCRETE MIXING

- A. Ready-Mixed or Site-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.
  - 1. Clean equipment used to mix and deliver cast-in-place concrete to prevent contamination from other concrete.
  - 2. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

## 2.8 STEEL REINFORCEMENT AND ACCESSORIES

- A. Reinforcing bars shall be ASTM A615, Grade 60, deformed. Reinforcing bars to be welded shall be ASTM A706.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire fabric in place; manufacture according to CRSI's "Manual of Standard Practice."
  - 1. Where legs of wire bar supports contact forms, use CRSI Class 1, gray, plastic-protected bar supports.

## 2.9 NON-METALLIC FIBER REINFORCEMENT

- A. Fiber reinforcement shall be as scheduled below as manufactured or approved equivalent. Dosage rate shall be as specified by the manufacturer. Use in strict accordance with the manufacturer's instructions.
  - 1. Fiber reinforcement for fiber-reinforced slabs shall be Novomesh® 950, or approved equivalent, applied at the application rate of 5.0 lbs. per cubic yard of concrete.

## 2.10 WATERSTOPS

- A. Standard waterstops shall be ribbed polyvinyl chloride (PVC) waterstops by the Paul Murphy Plastics Co., Vinylex Corporation, Greenstreak Co. or equal, at construction joints and control joints as indicated. Waterstops at expansion joints in new construction shall be ribbed, center-bulb type PVC. Waterstops for connection to future construction shall be ribbed or split-ribbed PVC. Thickness shall be 3/8-inch. Width shall be as indicated on the Contract Drawings. PVC waterstops shall meet Corps of Engineers CRD C572. Use in strict accordance with manufacturer's instructions. PVC waterstops shall be provided with integral hog rings to facilitate tie-off to reinforcing bars.
- B. Waterstops for use in chemical retaining structures shall be ribbed, center-bulb type thermoplastic rubber by Westec Barrier Technologies, or equal, at construction joints and control joints as indicated on the Contract Drawings. Thickness shall be 3/16-inch. Width shall be as indicated on the Contract Drawings.
- C. Flexible chloroprene rubber strips, such as Hydrotite Type CJ or RSS by the Greenstreak Plastic Products Co., Inc., Grace Adcor™ ES by Grace Construction Products, or equal, shall be used as swell-type waterstops in control joints, construction joints and cold joints where indicated on the Contract Drawings. Use in strict accordance with the manufacturer's instructions.



## PART 3 - EXECUTION

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### 3.1 FORMWORK

- A. Limit deflection of form-facing panels to not exceed ACI 347 requirements.
- B. In addition to ACI 347 limits on form-facing panel deflection, limit cast-in-place concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
  - 1. Class B, 1/4 inch (6 mm)
- C. Fabricate forms to result in cast-in-place concrete that complies with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-in-place surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood rustications, keyways, reglets, recesses, and the like, for easy removal.
  - 1. Seal form joints and penetrations at form ties with form joint tape or form joint sealant to prevent cement paste leakage.
  - 2. Do not use rust-stained steel form-facing material.
- E. 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.
- F. Chamfer exterior corners and edges of cast-in-place concrete.
- G. Coat contact surfaces of wood rustications and chamfer strips with sealer before placing reinforcement, anchoring devices, and embedded items.
- 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.
- L. Coat contact surfaces of forms with surface retarder, according to manufacturer's written instructions, before placing reinforcement.
- M. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and attach securely to prevent deflection and maintain stability of liners during concreting. Prevent form liners from sagging and stretching in hot weather. Seal joints of form liners and form liner accessories to prevent mortar leaks. Coat form liner with form-release agent.

### 3.2 REINFORCEMENT AND INSERTS

- A. Securely fasten steel reinforcement and wire ties against shifting during concrete placement.
- B. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

### 3.3 REMOVING AND REUSING FORMS



- A. 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 deg F (10 deg C) for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
  - 1. Cut off and grind glass-fiber-reinforced plastic form ties flush with surface of concrete.
- B. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 75 percent of 28-day design compressive strength. 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. Do not use split, frayed, delaminated, or otherwise damaged form-facing material. 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 cast-in-place concrete surfaces.

### 3.4 JOINTS

- A. Construction Joints: Install construction joints true to line with faces perpendicular to surface plane of cast-in-place concrete so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.
  - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated.
  - 2. Form keyed joints as indicated. [Embed keys at least 1-1/2 inches (38 mm) into concrete.] Align construction joint within rustications attached to form-facing material.
  - 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] <Insert spacing>. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
  - 6. Use [bonding agent] [epoxy-bonding adhesive] at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- B. Contraction Joints: Form weakened-plane contraction joints true to line with faces perpendicular to surface plane of cast-in-place concrete so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.

### 3.5 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, form-release agent, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.
- C. Before test sampling and placing concrete, water may be added at Project site, up to the limits of the specified water-cement ratio and slump, subject to limitations of ACI 301. This presumes that not all mixing water is added at the batching plant.
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to



mixture.

- D. Deposit concrete continuously between construction joints. Deposit concrete to avoid segregation.
  - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. Do not permit vibrators to contact forms.
- E. Cold-Weather Placement: Comply with ACI 306 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 average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  - 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.
  - 4. Do not use chemical accelerators unless otherwise specified and approved in design mixtures.
- F. Hot-Weather Placement: Comply with ACI 305 and as follows:
  - 1. Maintain concrete temperature below 90 deg F (32 deg C) 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. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

### 3.6 QUALITY CONTROL DURING CONSTRUCTION

- A. The Contractor shall employ a testing agency, approved by the Engineer, to perform tests and to submit test reports. Field testing to be performed by an ACI certified concrete field testing technician grade I. Coordinate this testing with the Owner's Special Inspection program.
- B. Sampling and testing for quality control during concrete placement may include the following, as directed by Engineer.
  - 1. Sampling Fresh Concrete: ASTM C172, except modified for slump to comply with ASTM C94.
    - a. Slump testing shall be in accordance with ASTM C143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
    - b. Air content testing shall be in accordance with ASTM C173, volumetric method for lightweight or normal weight concrete; ASTM C231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
    - c. Testing of concrete temperature shall be in accordance with ASTM C1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27





- deg C) and above, and one test for each set of compressive-strength specimens.
- d. Molding of cylinders for compression testing shall be in accordance with ASTM C31; one set of five standard 6-inch dia. cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
  - e. Compressive-strength testing shall be in accordance with ASTM C 39; one set for each 100 cu. yd. or fraction thereof, of each concrete mix placed in any one day; one specimen tested at 7 days, three specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
  3. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
  4. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
- C. Test results will be reported in writing to Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
  - D. Nondestructive testing shall consist of impact hammer, sonoscope, or other nondestructive device but shall not be used as the sole basis for acceptance or rejection.
  - E. The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Engineer. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed.

### 3.7 REMOVING FORMS

- A. Formwork not supporting the weight of concrete, such as sides of walls, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, concrete is able to support its own weight and provided curing and protection operations are maintained.
- B. Formwork supporting the weight of concrete, such as slabs and other structural elements, may be removed in less than 14 days but in no case until concrete has attained at least 75 percent of design minimum compressive strength at 28 days, unless otherwise noted. Determine representative compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
- C. Form-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.



### 3.8 REUSING FORMS

- A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to Owner's Representative.

### 3.9 CONCRETE SURFACE REPAIRS

- A. Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Owner's Representative.
- B. Mix dry-pack mortar, consisting of 1 part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
  - 1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
  - 2. For surfaces exposed to view, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- C. Remove and replace formed concrete having defective surfaces if defects cannot be repaired to satisfaction of Owner's Representative. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.
  - 1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.
- D. Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.
  - 1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
  - 2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
  - 3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Owner's Representative.
  - 4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in



diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

- E. Repair isolated random cracks and single holes 1 inch or less in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry-pack before bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- F. Perform structural repairs with prior acceptance by Owner's Representative for method and procedure, using specified epoxy adhesive and mortar.
- G. Repair methods not specified above may be used, subject to acceptance of Owner's Representative.

### 3.10 FINISHES, GENERAL

- A. Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or waterproofing; and where indicated.
- B. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances of F/F 18 (floor flatness) and F/L 15 (floor levelness) measured according to ASTM E 1155. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- C. Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with paint or another thin film-finish coating system.
- D. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F/F 20 (floor flatness) and F/L 17 (floor levelness) measured according to ASTM E1155. Grind smooth any surface defects that would telegraph through applied floor covering system.
- E. Apply a nonslip rough broom finish to exterior concrete equipment pads, walking surfaces and elsewhere as indicated.
- F. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.
- G. Maintain uniformity of special finishes over construction joints, unless otherwise indicated.

### 3.11 AS-CAST FORMED FINISHES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections exceeding specified limits on formed-surface irregularities.



- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Remove fins and other projections exceeding specified limits on formed-surface irregularities. Repair and patch tie holes and defects.
- C. Rubbed Finish: Apply the following to smooth-form-finished as-cast concrete where indicated:
  - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

### 3.12 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306 for cold-weather protection and with ACI 305 for hot-weather protection during curing.
- B. Begin curing cast-in-place concrete immediately after [removing forms from] [applying as-cast formed finishes to] concrete. Cure according to ACI 308.1, by one or a combination of the following methods that will not mottle, discolor, or stain concrete:
  - 1. Moisture Curing: Keep exposed surfaces of cast-in-place concrete continuously moist for not less than seven 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 (300-mm) 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 (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period; use cover material and waterproof tape.
  - 3. Curing Compound: Mist concrete surfaces with water. Apply curing compound 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.

### 3.13 CONCRETE WATERPROOF COATING

- A. Waterproof coating shall be Penetron® mixed at the ratio of 5 parts Penetron to 2 parts water. Application by brush or spray shall be at the rate of 0.164 pounds per square foot. Prepare concrete surfaces for Penetron in accordance with the manufacturer's instructions.

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**SECTION 03 93 00**  
**CONCRETE REHABILITATION**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. This Section includes the following:
1. Removal of deteriorated concrete and subsequent patching and rebuilding.
  2. Removal of existing equipment pads and subsequent patching of concrete floor.
  3. Crack injection.
  4. Corrosion-inhibiting treatments.
  5. Contingent concrete rehabilitation ordered in the field.

**1.2 SUBMITTALS**

- A. Include material descriptions, chemical composition, physical properties, test data, and mixing and application instructions.
- B. Include Material Safety Data Sheets, if applicable.
- C. Submit product certificates signed by manufacturers certifying that products furnished comply with requirements and are recommended by manufacturer for uses indicated.
- D. For products required to be installed by workers approved by product manufacturers, include letters of acceptance by product manufacturers certifying that installers are approved to apply their products.
- E. If alternative materials and methods to those indicated are proposed for any phase of rehabilitation work, submit substitution request and provide a written description of proposed materials and methods, including evidence of successful use on other comparable projects, and a testing program to demonstrate their effectiveness for this Project.

**1.3 QUALITY ASSURANCE**

- A. Installer shall be an experienced installer who employs workers trained and approved by manufacturer to apply corrosion-inhibiting treatments, concrete patching and rebuilding materials, and epoxy crack injection materials.
- B. Manufacturers shall have factory-trained representatives who are available for consultation and Project site inspection at no additional cost.
- C. Obtain each of the following through one source from a single manufacturer:
1. Concrete patching and rebuilding materials.
  2. Crack injection materials.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to Project site in manufacturer's original and unopened containers, labeled with type and name of products and manufacturers.

- B. Comply with manufacturer's written instructions for minimum and maximum temperature requirements and other conditions for storage.
- C. Store cementitious materials off the ground, under cover, and in a dry location.
- D. Store aggregates, covered and in a dry location, where grading and other required characteristics can be maintained and contamination avoided.

## 1.5 PROJECT CONDITIONS

- A. Do not apply when air and substrate temperatures are outside limits permitted by manufacturer. During hot weather, cool epoxy components before mixing, store mixed products in shade, and cool unused mixed products to retard setting. Do not apply to wet substrates unless approved by manufacturer.
  - 1. Use only Class A epoxies when substrate temperatures are below or are expected to go below 40 deg F within 8 hours.
  - 2. Use only Class A or B epoxies when substrate temperatures are below or are expected to go below 60 deg F within 8 hours.
  - 3. Use only Class C epoxies when substrate temperatures are above 60 deg F.
- B. Do not apply unless air temperature is between 40 and 90 deg F and will remain so for at least 48 hours after completion of Work.
- C. Comply with the following procedures:
  - 1. When air temperature is below 40 deg F, heat patching material ingredients and existing concrete to produce temperatures between 40 and 90 deg F.
  - 2. When mean daily air temperature is between 25 and 40 deg F, cover completed Work with weather-resistant insulating blankets for 48 hours after repair.
  - 3. When mean daily air temperature is below 25 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 48 hours after repair.
- D. Protect repair work when temperature and humidity conditions produce excessive evaporation of water from patching materials. Provide artificial shade and wind breaks, and use cooled materials as required. Do not apply to substrates with temperatures of 90 deg F and above.

## PART 2 - PRODUCTS

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### 2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide one of the following:
  - 1. Epoxy-Modified, Cementitious Bonding and Anticorrosion Agent:
    - a. Euclid Chemical Company; CORR-BOND.
    - b. Sika Corporation; Armatec 110 EpoCem.
    - c. Sonneborn, Div. of ChemRex, Inc.; Sonoprep.
    - d. or equal.
  - 2. Latex Bonding Agent, Type II:
    - a. Euclid Chemical Company; FLEX-CON.
    - b. Sonneborn, Div. of ChemRex, Inc.; Acrylic Additive.

- c. or equal.
- 3. Cementitious Patching Mortar, Rapid Setting:
  - a. Five Star Products, Inc.: Five Star Structural Concrete
  - b. Euclid Chemical Company; EUCO-SPEED.
  - c. Sika Corporation; Sikaset Roadway Patch.
  - d. or equal.
- 4. Polymer-Modified, Cementitious Patching Mortar:
  - a. Euclid Chemical Company; VERTICOAT.
  - b. Master Builders, Inc.; EMACO R320 CI.
  - c. Sika Corporation; SikaTop 121 Plus, SikaTop 122 Plus, SikaTop 123 Plus, or SikaTop 126 Plus.
  - d. Sonneborn, Div. of ChemRex, Inc.; Deep-Pour Mortar or Sonopatch 100.
  - e. or equal.
- 5. Polymer-Modified, Silica-Fume-Enhanced, Cementitious Patching Mortar:
  - a. Euclid Chemical Company; Verticoat Supreme.
  - b. Master Builders, Inc.; EMACO S88 CI.
  - c. Sika Corporation; Sika MonoTop 615.
  - d. or equal.
- 6. Epoxy Crack Injection Material:
  - a. Strata Tech, Inc.; ST 504 or ST 524.
  - b. Sika Corporation; Sikadur Injection Gel.
  - c. Prime Resins; Prime Flex 900 XLV.
  - d. or equal.
- 7. Low-Viscosity y Polyurethane Hydrophobic Injection Material:
  - a. Grace Construction: Cut Pure with Cut Cat Pure Catalyst
  - b. Green Mountain International: Mountain Grout Flex Classic with Mountain Grout Accelerator
  - c. Sika Corporation: SikaFix HH LV with SikaFix Accelerator
  - d. SealBoss Concrete Solutions: SealBoss 1510 with SealBoss 15x Accelerator
  - e. Or equal.

## 2.2 BONDING AGENTS

- A. Epoxy-modified, cementitious bonding and anticorrosion agent shall be a product that consists of water-insensitive epoxy adhesive, Portland cement, and water-based solution of corrosion-inhibiting chemicals that forms a protective film on steel reinforcement.
- B. Latex bonding agent shall meet ASTM C 1059, Type II.
- C. Mortar scrub-coat shall consist of 1 part Portland cement complying with ASTM C 150, Type I, II, or III and 1 part fine aggregate complying with ASTM C 144, except 100 percent passing a No. 16 sieve.



### 2.3 PATCHING MORTAR

- A. Unless otherwise indicated, use one of the following:
  - 1. Cementitious patching mortar shall be a packaged, dry mix complying with ASTM C 928.
  - 2. Polymer-modified, cementitious patching mortar shall be a packaged, dry mix complying with ASTM C 928, that contains a latex additive as either a dry powder or a separate liquid that is added during mixing.
  - 3. Polymer-modified, silica-fume-enhanced, cementitious patching mortar shall be a packaged, dry mix complying with ASTM C 928, that contains silica fume complying with ASTM C 1240 and a latex additive as either a dry powder or a separate liquid that is added during mixing.
- B. For overhead and vertical surface repairs, use patching mortar recommended by manufacturer for overhead and vertical surface use and as specified above.
- C. Coarse aggregate for adding to patching mortar for deeper applications shall be a washed aggregate complying with ASTM C 33, Size No. 8, Class 5S. Add only as permitted by patching mortar manufacturer.

### 2.4 CONCRETE

- A. Concrete Materials and Admixtures: Comply with Section entitled "Miscellaneous Cast-in- Place Concrete."
- B. Steel Reinforcement and Reinforcement Accessories: Comply with Section entitled "Cast-in- Place Concrete."

### 2.5 MISCELLANEOUS MATERIALS

- A. Epoxy capping adhesive shall be a product manufactured for use with crack injection adhesive by same manufacturer.

### 2.6 MIXES

- A. Mix products in clean containers according to manufacturer's written instructions.
  - 1. Add clean silica sand and coarse aggregates to products only as recommended by manufacturer.
  - 2. Do not add water, thinners, or additives unless recommended by manufacturer.
  - 3. When practical, use manufacturer's premeasured packages to ensure that materials are mixed in proper proportions. When premeasured packages are not used, measure ingredients using graduated measuring containers; do not estimate quantities or use shovel or trowel as unit of measure.
  - 4. Do not mix more materials than can be used within recommended open time. Discard materials that have begun to set.
- B. Mortar scrub-coat shall be mixed with enough water to provide a consistency of thick cream.
- C. Dry-pack mortar shall be mixed with just enough liquid to form a damp cohesive

mixture that can be squeezed by hand into a ball but is not plastic.

- D. Concrete shall comply with Section entitled "Cast-in-Place Concrete."

### **PART 3 - EXECUTION**

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#### **3.1 - PREPARATION**

- A. Protect people, motor vehicles, equipment, surrounding construction, Project site, plants, and surrounding buildings from injury resulting from concrete rehabilitation work.
1. Erect temporary protective covers over pedestrian walkways and at points of entrance and exit for people and vehicles that must remain in operation during course of concrete rehabilitation work. Construct covers of tightly fitted, 3/4-inch exterior-grade plywood supported at 16 inches o.c. and covered with asphalt roll roofing.
  2. Protect adjacent equipment and surfaces by covering them with heavy polyethylene film and waterproof masking tape or a liquid strippable masking agent. If practical, remove items, store, and reinstall after potentially damaging operations are complete.
  3. Neutralize and collect alkaline and acid wastes for disposal off OWNER'S property.
  4. Dispose of runoff from wet operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
- B. Install temporary supports prior to the start of concrete removal.
- C. For concrete removal, saw-cut perimeter of areas indicated for removal to a depth of at least 1/2-inch. Make cuts perpendicular to concrete surfaces and no deeper than cover on reinforcing. Remove loose and deteriorated concrete by breaking up and dislodging from reinforcing.
1. Remove concrete between cuts to a depth of at least 1/2-inch.
  2. Where half or more of the perimeter of reinforcing bar is exposed, bond between reinforcing bar and surrounding concrete is broken, or reinforcing bar is corroded, remove concrete from entire perimeter of bar to provide at least a 3/4-inch clearance.
  3. Test areas where concrete has been removed by tapping with hammer, and remove additional concrete until unsound concrete is completely removed.
  4. Provide fractured aggregate surfaces with a profile of at least 1/8-inch that are approximately perpendicular or parallel to original concrete surfaces. At columns and walls, make top and bottom surfaces level.
  5. Thoroughly clean removal areas of loose concrete, dust, and debris.
- D. For reinforcing bar preparation, remove loose and flaking rust from reinforcing bars by wire brushing until only tightly bonded light rust remains.
- E. Where section loss of reinforcing bar is more than 25 percent, or 20 percent in 2 or more adjacent bars, cut bars and remove and replace as directed by the CONSULTANT. Remove additional concrete as necessary to provide at least a 3/4-inch clearance at existing and replacement bars. Splice replacement bars to existing bars according to ACI 318, by lapping, welding, or using mechanical couplings.

- F. For corrosion-inhibiting treatment, clean concrete by low pressure water cleaning or sand blasting to remove dirt, oils, films, and other materials detrimental to treatment application. Allow surface to dry before applying corrosion-inhibiting treatment.

### 3.2 APPLICATION

- A. Apply epoxy-modified, cementitious bonding and anticorrosion agent to reinforcing bars and concrete by stiff brush or hopper spray according to manufacturer's written instructions. Apply to reinforcing bars in two coats, allowing first coat to dry two to three hours before applying second coat. Allow to dry before placing patching mortar or concrete.
- B. Mix latex bonding agent, Type II with Portland cement and scrub into concrete surface according to manufacturer's written instructions. If bonding agent dries, recoat before placing patching mortar or concrete.
- C. Dampen mortar scrub-coat repair area and surrounding concrete 6 inches beyond repair area. Remove standing water and apply scrub-coat with a brush, scrubbing it into surface and thoroughly coating repair area. If scrub-coat dries, recoat before applying patching mortar or concrete.
- D. Unless otherwise recommended by manufacturer, apply patching mortar as follows:
  - 1. Wet substrate thoroughly and then remove standing water. Scrub a slurry of neat patching mortar mixed with latex bonding agent into substrate, filling pores and voids.
  - 2. Place patching mortar by troweling toward edges of patch to force intimate contact with edge surfaces. For large patches, fill edges first and then work toward center, always troweling toward edges of patch. At fully exposed reinforcing bars, force patching mortar to fill space behind bars by compacting with trowel from sides of bars.
  - 3. For vertical patching, place material in lifts of not more than 2 inches nor less than 1/4 inch. Do not feather edge.
  - 4. For overhead patching, place material in lifts of not more than 2 inches nor less than 1/4 inch. Do not feather edge.
  - 5. After each lift is placed, consolidate material and screed surface.
  - 6. Where multiple lifts are used, score surface of lifts to provide a rough surface for application of subsequent lifts. Allow each lift to reach final set before placing subsequent lifts.
  - 7. Allow surfaces of lifts that are to remain exposed to become firm and then finish to a smooth surface with a wood or sponge float.
  - 8. Wet-cure cementitious patching materials, including polymer-modified, cementitious patching materials, for not less than seven days by water-fog spray or water-saturated absorptive cover.
- E. Use dry-pack mortar for deep cavities. Place according to manufacturer's written instructions and as follows:
  - 1. Provide forms where necessary to confine patch to required shape.
  - 2. Wet substrate and forms thoroughly and then remove standing water.
  - 3. Place dry-pack mortar into cavity by hand, and compact into place with a hardwood drive stick and mallet or hammer. Do not place more material at a time than can be properly compacted. Continue placing and compacting until patch is

approximately level with surrounding surface.

4. After cavity is filled and patch is compacted, trowel surface to match profile and finish of surrounding concrete. A thin coat of patching mortar may be troweled into the surface of patch to help obtain required finish.
  5. Wet-cure patch for not less than seven days by water-fog spray or water-saturated absorptive cover.
- F. Place concrete according to Section entitled "Miscellaneous Cast-in-Place Concrete" and as follows:
1. Apply epoxy-modified, cementitious bonding and anticorrosion agent to reinforcing.
  2. At unformed surfaces, screed concrete to produce a surface that when finished with patching mortar will match required profile and surrounding concrete.
  3. Wet-cure concrete for not less than seven days by leaving forms in place or keeping surfaces continuously wet by water-fog spray or water-saturated absorptive cover.
  4. Fill placement cavities with dry-pack mortar and repair voids with patching mortar. Finish to match surrounding concrete.
- G. Epoxy crack injection shall comply with manufacturer's written instructions and the following:
1. Clean areas to receive capping adhesive of oil, dirt, and other substances that would interfere with bond, and clean cracks with oil-free compressed air or low-pressure water to remove loose particles.
  2. Place injection ports as recommended by epoxy manufacturer, spacing no farther apart than thickness of member being injected. Seal injection ports in place with capping adhesive.
  3. Seal cracks at exposed surfaces with a ribbon of capping adhesive at least ¼-inch thick by 1 inch wider than crack.
  4. Inject cracks wider than 0.003 inch to a depth of 8 inches or to a width of less than 0.003 inch, whichever is less.
  5. Inject epoxy adhesive, beginning at widest part of crack and working toward narrower parts. Inject adhesive into ports to refusal, capping adjacent ports when they extrude epoxy. Cap injection ports and inject through adjacent ports until crack is filled.

**END OF SECTION**

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## SECTION 05 50 00 METAL FABRICATIONS

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### PART 1 - GENERAL

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#### 1.1 SUMMARY

- A. This Section includes miscellaneous metal fabrications as shown on the Contract Drawings, complete including fabrication, shop finishing and installation.

#### 1.2 REFERENCES

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:
1. American Society for Testing and Materials (ASTM)
  2. American Welding Society (AWS)
  3. Steel Structures Painting Council (SSPC)

#### 1.3 SUBMITTALS

- A. In addition to those submittals identified in the General Provisions, the following items shall also be submitted:
1. Shop drawings indicating profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
  2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

#### 1.4 QUALITY ASSURANCE

- A. Perform work in accordance with the following:
1. Prepare shop drawings under direct supervision of a Professional Engineer experienced in design of this work and licensed in the State of New York.
  2. Use certified welders employed on the Work, with verification of AWS qualification within the previous 12 months.

#### 1.5 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

### PART 2 - PRODUCTS

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#### 2.1 MATERIALS AND CONSTRUCTION

- A. Structural steel W-shapes shall be ASTM A992, Grade 50.
- B. Steel M, S, C, MC and L-shapes, plates and threaded rods shall be ASTM A36.
- C. Steel anchor bolts shall be ASTM F1554, Grade 36.
- D. Aluminum sections shall be ASTM B308, Alloy 6061-T6.



- E. Steel tubing shall be ASTM A500, Grade B.
- F. Steel pipe shall be ASTM A53, Grade B, Schedule 40. Bollards shall be Schedule 80.
- G. Bolts, nuts, and washers for structural steel connections shall be ASTM A325, galvanized to ASTM A153 for galvanized components.
- H. Stainless steel extrusions shall comply with ASTM A269, Type 304 or 316.
- I. Stainless steel bolts shall be ASTM A193, Type 304 or 316, grade B8 or B8M.
- J. Stainless steel nuts shall be ASTM A194, Type 304 or 316, grade 8 or 8M.
- K. Stainless steel washers shall be ANSI B18.22.1.
- L. Welding materials shall comply with AWS D1.1 or AWS D1.2; type required for materials being welded.
- M. Adhesive anchors for solid base substrates shall be a two-component adhesive system supplied in manufacturer's standard side-by-side or co-axial cartridge dispensed through a static mixing nozzle. System shall be capable of anchoring internally threaded inserts, threaded rods and steel reinforcing. Adhesive anchor system shall be one of the following:
  - 1. For applications above 40°F, use one of the following:
    - a. HIT HY 200 or HIT RE 500 Injection Adhesive system by HILTI, Inc.
    - b. SET High Strength Epoxy system by Simpson Strong-Tie
  - 2. For applications below 40°F, use one of the following:
    - a. HIT-ICE Injection Adhesive system by HILTI, Inc.
    - b. ACRYLIC-TIE system by Simpson Strong-Tie
- N. Adhesive anchors for hollow base substrates shall be a two-component adhesive system supplied in manufacturer's standard side-by-side or co-axial cartridge dispensed through a static mixing nozzle. System shall be capable of anchoring internally threaded inserts, threaded rods and steel reinforcing. Adhesive anchor system shall be one of the following:
  - 1. For applications above 40°F, use one of the following:
    - a. HIT HY 20 Injection Adhesive system with screen tube by HILTI, Inc.
    - b. SET High Strength Epoxy system with screen tube by Simpson Strong-Tie
  - 2. For applications below 40°F, consult manufacturer for recommendation.
- O. Expansion bolts shall be HSL Expansion anchors by HILTI, Inc. or WEDGE-ALL wedge anchors by Simpson Strong-Tie.
- P. Primer for steel shall be fast-curing, lead and chromate free, universal primer with good resistance to normal atmospheric corrosion, complying with performance requirements of FS-TT-P-664. Primer shall be compatible with finish paint system.

## 2.2 FABRICATION

- A. Fit and shop assemble in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. 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.
- D. Exposed mechanical fastenings shall consist of flush countersunk screws or bolts, unobtrusively located, consistent with design of component, except where specifically noted otherwise.
- E. Supply components required for anchorage of fabrications. Fabricate anchors and related.



components of same material and finish as fabrication, except where specifically noted otherwise.

### 2.3 FINISHES

- A. Surface preparation, primer and finish coatings shall be as specified in the Section entitled "Painting."
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Items to be galvanized shall be given a minimum 2.0 oz/sq ft zinc coating in accordance with ASTM A123.

## PART 3 - EXECUTION

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### 3.1 INSTALLATION

- A. Examination
  - 1. Verify that field conditions are acceptable and are ready to receive work.
  - 2. Beginning of installation means erector accepts existing conditions.
- B. Preparation
  - 1. Clean and strip primed steel items to bare metal where site welding is required.
  - 2. Supply items required to be cast into concrete or embedded in masonry with setting templates.
- C. Erection
  - 1. Install items plumb and level, accurately fitted, free from distortion or defects.
  - 2. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
  - 3. Field weld components indicated on shop drawings.
  - 4. Perform field welding in accordance with AWS D1.1 or AWS D1.2.
- D. Erection Tolerances
  - 1. Maximum variation from plumb shall be 1/4 inch per 10 feet, non-cumulative.
  - 2. Maximum offset from true alignment shall be 1/4 inch.
- E. Schedule
  - 1. Bollards shall be steel pipe, concrete filled, crowned cap, size as detailed; galvanized.
  - 2. Ledge and shelf angles, channels and plates not attached to structural framing shall be steel, prime painted.
  - 3. Lintels shall be galvanized steel, as detailed and prime painted.
  - 4. Overhead door frames and wall openings shall be steel channel sections, prime painted.
  - 5. Fixed metal ladders shall be aluminum, mill finish, unless indicated otherwise on the Contract Drawings.
  - 6. Aluminum structural shapes shall be mill finish.

END OF SECTION





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**SECTION 05 51 00**  
**METAL STAIRS**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. This Section Includes the following as shown on the Contract Drawings, complete including fabrication, shop finishing and installation:
1. Industrial-type stairs with aluminum grating treads.

**1.2 REFERENCES**

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:
1. American Society for Testing and Materials (ASTM)
  2. American Welding Society (AWS)
  3. Federal Specification
  4. National Association of Architectural Metal Manufacturers

**1.3 PERFORMANCE REQUIREMENTS**

- A. Structural Performance of Stairs: Provide metal stairs capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
1. Uniform Load: 100 lbf/sq. ft.
  2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.
  3. Uniform and concentrated loads need not be assumed to act concurrently.
  4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
  5. Limit deflection of treads, platforms, and framing members to  $L/360$  or  $1/4$  inch, whichever is less.
- B. Seismic Performance: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. Component Importance Factor is 1.5.

**1.4 QUALITY ASSURANCE**

- A. Installer Qualifications: Arrange for aluminum stairs specified in this Section to be fabricated and installed by the same firm.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal stairs that are similar to those indicated for this Project in material, design, and extent.
- C. Fabricator Qualifications: A firm experienced in producing metal stairs similar to those indicated for this Project and with a record of successful in-service performance, as well as



sufficient production capacity to produce required units.

- D. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum." Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved.

## 1.5 SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details for metal stairs. Include plans, elevations, sections, and details of metal stairs and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.
1. For installed products indicated to comply with design loads, include structural calculations and data signed and sealed by the licensed professional engineer responsible for their preparation. The Contractor shall pay for all costs associated with engineering costs.
- B. Welding Certificates: Copies of certificates for welding procedures and personnel.

## 1.6 COORDINATION

- A. Coordinate installation of anchorages for aluminum stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

## 1.7 STORAGE AND PROTECTION

- A. Store members off ground and protect members and package materials from erosion and deterioration.

## PART 2 - PRODUCTS

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### 2.1 MATERIALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Project include, but are not limited to, the following:
1. Karnel, Inc.
  2. Val-Fab, inc.

### 2.2 FASTENERS

- A. Provide fasteners of aluminum, nonmagnetic stainless steel, zinch-plated steel, or other material warranted by the manufacturers to be non-corrosive and compatible with aluminum gratings and other components.

### 2.3 FABRICATION, GENERAL

- A. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated.



Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  2. Obtain fusion without undercut or overlap.
  3. Remove welding flux immediately.
  4. Weld exposed corners and seams continuously unless otherwise indicated.
  5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for [Type 1 welds: no evidence of a welded joint] [Type 2 welds: completely sanded joint, some undercutting and pinholes okay] [Type 3 welds: partially dressed weld with spatter removed] [Type 4 welds: good quality, uniform undressed weld with minimal splatter].
- B. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchorage devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.
- C. Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for re-assembly and coordinated installation.

## 2.4 ALUMINUM-FRAMED STAIRS

- A. Stair Framing: Fabricate stringers of aluminum channels, plates, or a combination of both, as indicated. Provide closures for exposed ends of stringers. Construct platforms of aluminum channel headers and miscellaneous framing members as indicated. Bolt or weld headers to stringers; bolt or weld framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.

## 2.5 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal stairs after assembly.
- C. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed products:
1. Interior Stairs: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  2. Interior Stairs: SSPC-SP 3, "Power Tool Cleaning."
- E. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.



**PART 3 - EXECUTION**

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**3.1 INSTALLATION, GENERAL**

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- E. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

**3.2 INSTALLING METAL STAIRS WITH GROUTED BASEPLATES**

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of baseplates.
- B. Set aluminum stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
  - 1. Use nonmetallic, nonshrink grout unless otherwise indicated.
  - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

**END OF SECTION**



**SECTION 05 52 13**  
**PIPE AND TUBE RAILINGS**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. This Section Includes the following as shown on the Contract Drawings, complete including fabrication, shop finishing and installation.
1. Aluminum pipe and tube railings.

**1.2 REFERENCES**

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:
1. American Society for Testing and Materials (ASTM)
  2. American Welding Society (AWS)
  3. Federal Specification
  4. National Association of Architectural Metal Manufacturers
  5. Steel Structures Painting Council (SSPC)
  6. Occupational Safety and Health Administration (OSHA), Department of Labor

**1.3 PERFORMANCE REQUIREMENTS**

- A. All railings shall be in accordance with applicable OSHA regulations.
- B. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
1. Steel: 72 percent of minimum yield strength.
  2. Aluminum: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.
  3. Stainless Steel: 60 percent of minimum yield strength.
- D. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Handrails and Top Rails of Guards:
    - a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
    - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  2. Infill of Guards:
    - a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
    - b. Infill load and other loads need not be assumed to act concurrently.



- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- F. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

#### **1.4 QUALITY ASSURANCE**

- A. Obtain each type of handrail and railing through one source from a single manufacturer.
- B. Welding Qualifications: Quality procedures and personnel according to the following:
  - 1. AWS D1.1, "Structural Welding Code – Steel"
  - 2. AWS D1.2, "Structural Welding Code – Aluminum"
  - 3. AWS D1.6, "Structural Welding Code – Stainless Steel"

#### **1.5 SUBMITTALS**

- A. In addition to those submittals identified in the General Provisions, the following shall also be submitted.
  - 1. Shop Drawings indicating fabrication and installation of handrails and railings. Include plans, elevations, sections, component details, and attachments to other Work.
    - a. Indicate welded connection using standard AWS A2.0 welding symbols. Indicate net weld lengths.
    - b. Welding certificates.
  - 2. Grout, anchoring cement, and paint products.

#### **1.6 STORAGE**

- A. Store handrails and railings in a dry, well-ventilated, away from uncured concrete and masonry and protected from weather, moisture, soiling, abrasion extreme temperature and humidity.

#### **1.7 PROJECT CONDITIONS**

- A. Where handrails and railing systems are indicated to fit to other construction, check actual dimensions of other construction by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

#### **1.8 COORDINATION AND SCHEDULING**

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.



- C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

## **PART 2 - PRODUCTS**

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### **2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Aluminum Pipe and Tube Railings:
    - a. ATR Technologies, Inc.
    - b. Blum, Julius & Co., Inc.
    - c. Braun, J. G., Company; a division of the Wagner Companies.
    - d. CraneVeyor Corp.
    - e. Hollaender Manufacturing Company.
    - f. Kee Industrial Products, Inc.
    - g. Moultrie Manufacturing Company.
    - h. Pisor Industries, Inc.
    - i. Sterling Dula Architectural Products, Inc.; Div. of Kane Manufacturing.
    - j. Superior Aluminum Products, Inc.
    - k. Thompson Fabricating, LLC.
    - l. Tri Tech, Inc.
    - m. Tubular Specialties Manufacturing, Inc.
    - n. Tuttle Railing Systems; Div. of Tuttle Aluminum & Bronze, Inc.
    - o. Wagner, R & B, Inc.; a division of the Wagner Companies.
  2. Stainless-Steel Pipe and Tube Railings:
    - a. Blum, Julius & Co., Inc.
    - b. Paragon Aquatics; Division of Pentair, Inc.
    - c. Pisor Industries, Inc.
    - d. Stainless Fabricators, Inc.
    - e. Sterling Dula Architectural Products, Inc.; Div. of Kane Manufacturing.
    - f. Tri Tech, Inc.
    - g. Tubular Specialties Manufacturing, Inc.
    - h. Tuttle Railing Systems; Div. of Tuttle Aluminum & Bronze, Inc.
    - i. Wagner, R & B, Inc.; a division of the Wagner Companies.

### **2.2 METALS, GENERAL**

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.





## 2.3 ALUMINUM

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
- B. Extruded Bars and Tubing: ASTM B 221 (ASTM B 221M), Alloy 6063-T5/T52.
- C. Extruded Structural Pipe and Round Tubing: ASTM B 429/B 429M, Alloy 6063-T6.
  - 1. Provide Standard Weight (Schedule 40) pipe, unless otherwise indicated.
- D. Drawn Seamless Tubing: ASTM B 210 (ASTM B 210M), Alloy 6063-T832.
- E. Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
- F. Die and Hand Forgings: ASTM B 247 (ASTM B 247M), Alloy 6061-T6.
- G. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

## 2.4 FASTENERS

- A. General: Provide the following:
  - 1. Aluminum Railings: [Type 304] [Type 316] stainless-steel fasteners.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

## 2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
  - 1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Shop Primers: Provide primers that comply with Division 09 painting Sections.
- C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
  - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- G. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

## 2.6 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions,



- member sizes and spacing, details, finish, and anchorage], but not less than that required to support structural loads].
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
  - C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
  - D. Form work true to line and level with accurate angles and surfaces.
  - E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
  - F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
  - G. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
    1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
    2. Obtain fusion without undercut or overlap.
    3. Remove flux immediately.
    4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
  - H. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
  - I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
    1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
  - J. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
  - K. Close exposed ends of railing members with prefabricated end fittings.
  - L. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
  - M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
    1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
  - N. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
  - O. For railing posts set in concrete, provide aluminum sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with



metal plate forming bottom closure.

- P. For removable railing posts, fabricate slip-fit sockets from [steel] [stainless-steel] tube or pipe whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.
- Q. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

## 2.7 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

## 2.8 ALUMINUM FINISHES

- A. Mechanical Finish: AA-M12 (Mechanical Finish: nonspecular as fabricated).
- B. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

## 2.9 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
  3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).
- C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

## 2.10 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.



- B. **Welded Connections:** Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- C. **Expansion Joints:** Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches (50 mm) beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches (150 mm) of post.

### 2.11 ANCHORING POSTS

- A. Use metal sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Form or core-drill holes not less than 5 inches (125 mm) deep and 3/4 inch (20 mm) larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- C. Cover anchorage joint with flange of same metal as post, attached to post with set screws.
- D. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
  1. For aluminum pipe railings, attach posts using fittings designed and engineered for this purpose.
  2. For stainless-steel pipe railings, weld flanges to post and bolt to supporting surfaces.
  3. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.
- E. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

### 2.12 ATTACHING RAILINGS

- A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing ends or connected to railing ends using nonwelded connections.
- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends or connected to railing ends using nonwelded connections.

### 2.13 ADJUSTING AND CLEANING

- A. Clean [aluminum] [and] [stainless steel] by washing thoroughly with clean water and soap and rinsing with clean water.
- B. **Touchup Painting:** Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- C. **Galvanized Surfaces:** Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

### 2.14 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.



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

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**END OF SECTION**



## SECTION 05 53 00 METAL GRATINGS

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### PART 1 - GENERAL

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#### 1.1 SUMMARY

- A. This Section Includes the Following:
1. Metal bar gratings.
  2. Extruded-aluminum plank gratings.
  3. Metal frames and supports for gratings.

#### 1.2 REFERENCES

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements are specified herein:
1. National Association of Architectural Metal Manufacturer's (NAAMM)
    - a. NAAMM MBG 531 - Metal Bar Grating Manual for Steel, Stainless Steel and Aluminum Gratings and Stair Treads.
    - b. NAAMM MBG 532 - Heavy-Duty Metal Bar Grating Manual for Structural Carbon Steel and Stainless Steel
    - c. Metal Finishes Manual for Architectural and Metal Products
  2. American Welding Society (AWS)
    - a. AWS D1.1 - Structural Welding Code - Steel
    - b. ASW D1.2 - Structural Welding Code - Aluminum
    - c. AWS D1.6 - Structural Welding Code - Stainless Steel
  3. American Society for Testing and Materials (ASTM)
    - a. ASTM A36 - Carbon Structural Steel.
    - b. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
    - c. ASTM A510 - General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
    - d. ASTM A1011 - Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
    - e. ASTM A653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
    - f. ASTM A780 - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
    - g. ASTM B633 - Electrodeposited Coatings of Zinc on Iron and Steel
    - h. ASTM F1267 - Metal, Expanded, Steel
    - i. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate
    - j. ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes



**1.3 QUALITY ASSURANCE**

- A. Fabricator shall be experienced in producing gratings similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Metal Bar Grating Standards: Comply with applicable requirements of the following:
  - 1. Non-Heavy-Duty Metal Bar Gratings: Comply with NAAMM MBG 531, "Metal Bar Grating Manual for Steel, Stainless Steel, and Aluminum Gratings and Stair Treads."
- C. Comply with applicable provisions of AWS D1.1 "Structural Welding Code – Steel", AWS D1.2 "Structural Welding Code – Aluminum", and AWS D1.3 "Structural Welding Code – Sheet Steel".
  - 1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

**1.4 SUBMITTALS**

- A. Submit the following in accordance with the General Provisions:
  - 1. Product Data
    - a. Metal bar gratings.
    - b. Clips and anchorage devices for gratings.
  - 2. Shop Drawings detailing fabrication and erection of gratings. Include plans, elevations, sections, and details of connections. Show areas of fixed and removable sections, anchorage, accessory items, and load tables. Provide templates for anchors and bolts specified for installation under other Sections.
  - 3. Welding Certificates: Copies of certificates for welding procedures and personnel.

**1.5 PROJECT CONDITIONS**

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

**1.6 COORDINATION**

- A. Coordinate installation of anchorages for gratings, grating frames, and supports. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

**PART 2 - PRODUCTS**

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**2.1 ALUMINUM**

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer for type of use indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
- B. Extruded Bars and Shapes: ASTM B 221 (ASTM B 221M), alloys as follows:
  - 1. 6061-T6 or 6063-T6, for bearing bars of gratings and shapes.
  - 2. 6061-T1, for grating crossbars.



- C. Aluminum Sheet: ASTM B 209 (ASTM B 209M), Alloy 5052-H32.

## 2.2 FASTENERS

- A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
  - 1. Provide stainless-steel fasteners for fastening aluminum.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts, and, where indicated, flat washers; ASTM F 593 (ASTM F 738M) for bolts and ASTM F 594 (ASTM F 836M) for nuts, Alloy [Group 1 (A1)] [Group 2 (A4)].
- D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
  - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).
- F. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).

## 2.3 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy that is welded.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.4 FABRICATION

- A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.
- D. Fit exposed connections accurately together to form hairline joints.
- E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.

## 2.5 METAL BAR GRATINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering





products that may be incorporated into the Work include, but are not limited to, the following:

1. IKG Industries; a division of Harsco Corporation.
  2. Ohio Gratings, Inc.
  3. Klemp. Corp
- B. Pressure-Locked, Rectangular Bar Aluminum Grating: Fabricated by pressing rectangular flush-top crossbars into slotted bearing bars or swaging crossbars between bearing bars.
1. Bearing Bar Spacing: 1-3/16 inches
  2. Bearing Bar Depth: As indicated on the Contract Drawings.
  3. Bearing Bar Thickness: 3/16 inch
  4. Crossbar Spacing: 4 inches o.c.
  5. Traffic Surface: As indicated.
  6. Aluminum Finish: Class I, clear anodized finish.
- C. Removable Grating Sections: Fabricate with banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated or, if not indicated, as recommended by manufacturer for attaching to supports.
1. Provide no fewer than four weld lugs for each heavy-duty grating section, with each lug shop welded to two bearing bars.
  2. Provide no fewer than four saddle clips for each grating section composed of rectangular bearing bars 3/16 inch (4.8 mm) or less in thickness and spaced 15/16 inch (24 mm) or more o.c., with each clip designed and fabricated to fit over two bearing bars.
  3. Provide no fewer than four weld lugs for each grating section composed of rectangular bearing bars 3/16 inch (4.8 mm) or less in thickness and spaced less than 15/16 inch (24 mm) o.c., with each lug shop welded to three or more bearing bars. Interrupt intermediate bearing bars as necessary for fasteners securing grating to supports.
  4. Furnish threaded bolts with nuts and washers for securing grating to supports.
  5. Furnish self-drilling fasteners with washers for securing grating to supports.
  6. Furnish galvanized malleable-iron flange clamp with galvanized bolt for securing grating to supports. Furnish as a system designed to be installed from above grating by one person.
    - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) Kee Industrial Products, Inc.; Grating Clip.
      - 2) Lindapter North America, Inc.; Grate-Fast.
- D. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.
1. Edge-band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars.
- E. Do not notch bearing bars at supports to maintain elevation.

## 2.6 GRATING FRAMES AND SUPPORTS

- A. Frames and Supports for Metal Gratings: Fabricate from metal shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive



gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.

1. Unless otherwise indicated, fabricate from same basic metal as gratings.
  2. Equip units indicated to be cast into concrete or built into masonry with integrally welded anchors. Unless otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4-inch-thick by 8 inches long.
- B. Galvanize steel frames and supports in the following locations:
1. Exterior.
  2. Interior, where indicated.

## 2.7 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: Nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

## PART 3 - EXECUTION

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### 3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  1. Perform all cutting and fitting required for installation. Grating shall be placed such that cross bars align.
  2. Wherever grating is pierced by pipes, ducts and structural members, cut openings neatly and accurately to size and weld a rectangular band bar of the same height and material as bearing bars.
  3. Cutouts for circular obstructions are to be at least 2 inches larger in diameter than the obstruction. Cutouts for all piping 4 inches or less shall be made in the field.
  4. All rectangular cutouts are to be made to the next bearing bar beyond the penetration with a clearance not to exceed bearing bar spacing.
  5. Utilize standard panel widths wherever possible.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.
- D. Fit exposed connections accurately together to form hairline joints.
  1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.



- E. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

### **3.2 INSTALLING METAL BAR GRATINGS**

- A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.
- B. Attach removable units to supporting members with type and size of clips and fasteners indicated or, if not indicated, as recommended by grating manufacturer for type of installation conditions shown.
- C. Attach nonremovable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

### **3.3 ADJUSTING AND CLEANING**

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
  - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

**END OF SECTION**



**SECTION 40 95 14**  
**PLC CONTROL SYSTEM COORDINATION**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. This Section includes general requirements for the CONTRACTOR'S coordination with the Erie County Water Authority's (ECWA) Supervisory Control and Data Acquisition (SCADA) / Programmable Logic Control (PLC) system (referred to as SCADA System within this document).
- B. The CONTRACTOR shall contract separately with KAMAN Automation, Inc. 1000 University Ave. Rochester, NY 14607, (585)254-8840, for modification to the PLC control system for this project. KAMAN shall provide SCADA and PLC control system modifications in accordance with the Contract Documents and existing Process Control System.
- C. The CONTRACTOR shall coordinate their work with that of KAMAN to provide a complete operating system.
- D. The CONTRACTOR shall install and label all conduit and conductors for the work performed by KAMAN. KAMAN shall then make final terminations to the terminals within the control panels.
- E. The CONTRACTOR shall perform field-testing and a formal site acceptance test in conjunction with KAMAN as indicated on the Contract Drawings and detailed within this Specification.
- F. Coordination under this Contract shall include termination of all field wiring on the terminal strips within the respective panel, labeling and complete site acceptance testing of all input/output signals.
- G. KAMAN will update the existing PLC drawings for the PLC on the second floor in the Chemical Control Area for new instrumentation inputs. The Of-Record PLC/Control Panel drawings shall be turned over to the client (ECWA) at the close of the project in hardcopy and digital forms. The digital files shall be AutoCAD 2016 .dwg format and saved to two (2) duplicate DVD discs.
- H. The Contract shall include control panel terminations to be made by KAMAN, with all field wiring and field terminations to be made by the CONTRACTOR. As part of the Contract, KAMAN shall supply any necessary hardware and equipment to make the necessary terminations.
- I. The Contract shall include the supply (by KAMAN) of Fluoride and Potassium Permanganate leak detection switches per ECWA spec LEAK-500-P-S-PTFE with 15 meter cables. This shall also include the termination of the switches and programming at the existing PLC on the second floor as well as startup and testing.
- J. The Contract shall include the supply (by Kaman) of a Potassium Permanganate ultrasonic transducer and transmitter, Siemens HydroRanger 200 HMI. This shall also include the termination of the transmitter and programming at the existing PLC on the second floor as well as startup and testing.
- K. The Contract shall include the supply (by Kaman) of the Potassium Permanganate Control Panel. This should include termination of any wiring within the control panel and programming at the existing PLC on the second floor to accept any signals from the control panel. Also included is startup and testing.
- L. The Contract shall include the submittal of an updated Of-Record drawings package and O&M manuals provided by KAMAN.
- M. This Contract shall include a minimum of two (4 hour) training sessions on operation at the end of the project provided by KAMAN.



- N. The Contractor shall include the supply (by Kaman) a Mixer VFD Control Panel. The Mixer Control Panel shall contain controls similar to that of the existing Mixer Control panel, however now containing 3 Schneider Altivar VFD's. The supply of the Mixer Control Panel shall include Programming, installation, testing, and training of the associated equipment.

## **PART 2 - PRODUCTS (BY KAMAN)**

---

### **2.1 GENERAL**

- A. The SCADA and PLC logic control system shall provide monitoring and control of the following equipment:
1. Fluoride and Potassium Permanganate leak detection switches
  2. Potassium Permanganate ultrasonic transducer
  3. Coagulation Basin sludge analyzer
  4. Potassium Permanganate control panel

### **2.2 COMPONENTS FURNISHED BY KAMAN**

- A. KAMAN will provide the SCADA Components and PLC components required for this project. Components provided by KAMAN shall be installed and connected by KAMAN unless otherwise indicated.

### **2.3 SOFTWARE FURNISHED BY KAMAN**

- A. Software shall be of the same revision as existing plant PLC.

## **PART 3 - EXECUTION**

---

### **3.1 INSTALLATION**

- A. General
1. All SCADA system components shall be installed by KAMAN as specified, directed and recommended by the manufacturers.

### **3.2 APPLICATIONS SOFTWARE (BY KAMAN)**

- A. General
1. The OWNER's SCADA system will be modified to incorporate the control, monitor and log the operation of instrumentation and control panel that is to be installed under this Contract.
  2. The existing PLC control logic will be modified by KAMAN to incorporate the new instrumentation and control panel.
- B. PLC network startup requirements.
1. The CONTRACTOR shall provide all conduit, cable and control wires providing 10'0" of spare control/status cable at each existing PLC Panel or control panel for termination by KAMAN.
  2. Following installation of the control cables by the CONTRACTOR and termination of these cables by KAMAN, the CONTRACTOR and KAMAN shall verify that the control/status signals are functioning correctly.



**3.3 SITE ACCEPTANCE TESTING (SAT)****A. General**

1. Following the installation of the SCADA system and connection of all field I/O signals, the CONTRACTOR and KAMAN shall prepare a system test procedure to verify the proper transmission of all input and output signals to and from the I/O racks (full loop test). The field-testing procedure shall demonstrate conformance of the total system to these Specifications and the Project requirements. The CONTRACTOR shall correct any deficiencies found to be a result of his contract, at his own expense and the tests shall be repeated. This process shall continue until all tests have been successfully completed.
2. Documentation
  - a. Each input/output point shall be verified for proper operation. Proper operation includes instrumentation set-up and calibration, and verification that the interface between the instrument and the SCADA system is functioning properly. The SAT document shall include sign-off's for each I/O signal.
  - b. Analog input signals shall be tested at 4mA, 12mA and 20mA with a simulator and then verified for proper operation with the primary element (LIT). The raw value on the OIT shall be noted for each of the 3 signal levels. Instrument range and units shall be noted in the SAT documentation package.
  - c. Analog output signals shall be tested at 4mA, 12mA and 20mA from the OIT. The primary element (FCV, etc) shall be verified for proper operation at the 3 signal levels.
  - d. Digital input signals shall be tested in the energized and de-energized positions. The primary element (starter, LSH, ZSO, etc.) shall be exercised for this test when practical.
  - e. Digital output signals shall be tested in the energized and de-energized positions. The primary element (starter, ZC, etc.) shall be exercised and monitored for this test when practical.

**PART 4 - PROCESS CONTROL DESCRIPTIONS**

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**4.1 GENERAL**

- A. The existing PLC control logic will be modified by KAMAN.
- B. Process Control Description.
  1. Control sequences are not being modified as part of this contract. Therefore, control descriptions are not being provided.
  2. KAMAN shall coordinate with OWNER for existing control descriptions, should they be required for his work.

END OF SECTION



**SECTION 46 33 48**  
**INSTALLATION OF SLUDGE ANALYZERS**

---

**PART 1 - GENERAL**

---

**1.1 SUMMARY**

- A. This Section includes installation and startup of three different On-Line Sludge Level Analyzers (sludge analyzer) as part of a demonstration testing. The sludge analyzers will be provided by the OWNER. Installation of the equipment and power and control wiring shall be the responsibility of the CONTRACTOR. A detailed outline of the OWNER's and CONTRACTOR's responsibilities is provided in Part 3 of this Section.
- B. The CONTRACTOR is responsible for all necessary coordination with the OWNER and CONSULTANT.

**PART 2 - PRODUCTS**

---

**2.1 MANUFACTURERS**

- A. Three manufacturers have agreed to participate in the On-line Sludge Level Analyzer demonstration testing. Those three manufacturers are as follows:
  - 1. Markland Automatic Sludge Blanket Level Detector – optical (infrared) sensor
  - 2. Pulsar Sludge Finder 2 –ultrasonic sensor
  - 3. Hach Sonatax – ultrasonic sensor
- B. OWNER will supply an analyzer from each of the above manufacturers for a test period of 30-60 days.

**PART 3 - EXECUTION**

---

**3.1 INSTALLATION AND START-UP**

- A. OWNER is responsible for providing each sludge analyzer (and associated control box, if applicable) for a test period of 30-60 days.
- B. Each sludge analyzer will be installed by the CONTRACTOR in accordance with the manufacturer's recommendations.
- C. Any permanent modifications to the Coagulation Basin that is required for installation of the sludge analyzer that is in addition to the Work on the Contract Drawings shall be approved by the OWNER prior to installation.
- D. Only one analyzer will be installed and tested at a time. Analyzers shall be installed in the same location for each test duration.
- E. The sludge analyzer manufacturer shall provide remote services during installation and startup, including but not limited to, installation and start-up instructions and troubleshooting.
- F. CONTRACTOR shall be responsible for start-up for each of the three analyzers. CONTRACTOR shall ensure that the analyzer remains in operation for the duration of the demonstration testing and shall be responsible for any maintenance or necessary adjustments.

- G. CONTRACTOR shall provide power and control wiring for the sludge analyzers, as indicated on the Contract Drawings. CONTRACTOR shall coordinate power and control requirements with the OWNER prior to installation.
- H. CONTRACTOR shall be responsible for uninstalling the sludge analyzer, control box, and all associated accessories at the completion of the demonstration testing. Equipment shall be turned over to the OWNER.
- I. CONTRACTOR shall be responsible for modifying the installation apparatus for each of the different sludge analyzers based on each manufacturer's recommendations.
- J. OWNER shall be responsible for collecting and analyzing any data associated with the sludge analyzers.

### 3.2 FIELD TESTS

- A. The CONTRACTOR shall conduct an operational test of each analyzer for the duration of four hours. Tests shall demonstrate that all equipment is:
  - 1. Properly Installed.
  - 2. Electrically, mechanically, structurally, and otherwise acceptable.
  - 3. Has been properly connected.
  - 4. Is in optimum working condition.
- B. CONTRACTOR shall demonstrate that each part individually and all parts together, including appurtenances, function properly in the manner intended. The manufacturer shall instruct the CONTRACTOR on any required adjustments. All tests shall be subject to the CONSULTANT's review.

**END OF SECTION**



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ERIE COUNTY WATER AUTHORITY  
BUFFALO, NEW YORK

CONTRACT NO: OBG-12A  
STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT  
PROJECT NO: 201500169

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ERIE COUNTY WATER AUTHORITY  
295 MAIN STREET, ROOM 350  
BUFFALO, NEW YORK 14203

CONTRACT No: OBG-12A  
STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT  
PROJECT No: 201500169

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, Sturgeon Point and Van De Water Improvements Project, 722 Sturgeon Point Road, Derby, NY, TOWN OF EVANS and 3750 River Road, Tonawanda, NY, TOWN OF TONAWANDA. The Work consists of a single contract for the demolition of a portion of the EPDM baffle walls and installation of concrete bench walls in Flocculation Basin Nos. 1 through 5; installation of 12-inch slide gates in Flocculation Basin Nos. 3, 4 and 5, removal and disposal of sludge in the Coagulation Basin Influent Channel; installation of access hatches and sampling ports on Sedimentation Basin Nos. 1 through 5; repair of the SuperScraper assemblies in Sedimentation Basin Nos. 1 through 5; replacement of the 20-inch drain valve and the 8-inch sludge draw-off isolation valve in Sedimentation Basin Nos. 1 through 5; installation of a new filter aid air compressor system; installation of three new caustic pumps; installation of three potassium permanganate tanks, mixers and associated piping; replacement of two hydrofluosilicic acid bulk storage tanks and associated piping; coating of the floors, walls and ceiling of the Fluoride Room; removal of two polyaluminum chloride bulk storage tanks; removal of one caustic soda bulk storage tank; separation of potable water systems from non-potable water systems at the WTP through the installation of RPZs and new piping; miscellaneous site demolition and restoration work; installation of new lighting in the Chemical Control Area; replacement of the heating and ventilation system in the Fluoride Room; miscellaneous structural modifications and repairs; miscellaneous painting; and miscellaneous electrical modifications at the Sturgeon Point Water Treatment Plant, Town of Evans. Under the same contract the Work includes the replacement of one hydrofluosilicic acid bulk storage tank and associated piping; and miscellaneous painting at the Van de Water Treatment Plant, Town of Tonawanda.

Bids will be received by the Erie County Water Authority until 11:00 a.m. prevailing time, on Tuesday, October 25, 2016 at the Cashier's Office of the Authority, 295 Main Street, Room 350, Buffalo, New York 14203, and then at that time and place will be publicly opened and read.

All bids being mailed (including FedEx, UPS, Priority Mail, etc.) or hand-delivered to the Erie County Water Authority shall be directed to the "CASHIER'S OFFICE" 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 Sturgeon Point and Van de Water Improvements Project, 722 Sturgeon Point Road, Derby, NY, TOWN OF EVANS and 3750 River Road, Tonawanda, NY, TOWN OF TONAWANDA". Failure to follow the above instructions could result in rejection of the bid.

Beginning at 9:00 a.m., on Tuesday, September 27, 2016, the Instruction to Bidders, Form of Bid and form of Contract, Specifications, and Security Bonds may be examined at the above address

and may be obtained by writing the Cashier's Office at the above address or calling (716) 849-8484, between the hours of 9:00 a.m. and 5:00 p.m. upon payment of a deposit of Fifty Dollars (\$50.00). Check for documents shall be made payable to Erie County Water Authority.

Contract Documents are also available by mail through the following procedure. The ENGINEER will mail the Contract Documents to those wishing to obtain a set upon receipt of the document deposit described above plus a non-refundable mailing and handling charge of twenty five dollars (\$25.00) per set. The mailing date will be considered the bidder's date of receipt. Partial sets of documents will not be available. The \$50.00 deposit check for mailed documents shall be sent to the ENGINEER with the \$25.00 mailing and handling check. The mailing and handling check (\$25.00) shall be made payable to the ENGINEER. Deposits for deposit checks will be refunded to Bidders who return the documents within seven (7) days after the Bid Opening. Checks for mailing costs will not be refunded.

A pre-bid meeting will be held at 10:00 a.m., prevailing time, on Tuesday, October 12, 2016, at 722 Sturgeon Point Road, Derby, NY 14047. Attendance at the pre-bid meeting is recommended but is not mandatory.

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.

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:

Michelle McEntire, PE  
400 Andrews Street, Suite 710  
Rochester, New York 14604  
585-295-7713  
michelle.mcentire@obg.com

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

JOSEPH T. BURNS  
Secretary to the Authority

Engineer:  
O'Brien & Gere Engineers  
Michelle McEntire, PE  
400 Andrews Street, Suite 710  
Rochester, New York 14604  
585-295-7713

ERIE COUNTY WATER AUTHORITY  
BUFFALO, NEW YORK

CONTRACT No.: OBG-12A  
STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT  
PROJECT No.: 201500169

SECTION 00200

INSTRUCTIONS TO BIDDERS

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## 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 01 11 00 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 Cashier Office of the Erie County Water Authority, 295 Main Street, Room 350, Buffalo, New York 14203.
- 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 actual knowledge of a hazardous environmental condition at the Site.

6.04 Provisions concerning responsibilities for the adequacy of data, if any, furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities, and possible changes in the Bidding Documents due to differing or unforeseen conditions appear in paragraphs 4.02, 4.03 and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Bidding Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the Scope of Work appear in paragraph 4.06 of the General Conditions.

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

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

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

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

- A. Examine and carefully study the Bidding Documents, including any Addenda and the other related data identified in the Bidding Documents;
- B. Visit the Site and become familiar with and satisfy Bidder as to the general, local and Site conditions that may affect cost, progress and performance of the Work;
- C. Become familiar with and satisfy Bidder as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work;
- D. Carefully study all reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions, and to carefully study all reports and drawings of a Hazardous Environmental Condition identified at the Site, if any, which have been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions;
- E. Obtain and carefully study (or assume responsibility for having done so) all examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by Bidder, including any specific means, methods, techniques, sequences and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto;
- F. Agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for the performance of the Work at the price bid and within the times and in accordance with the other terms and conditions of the Bidding Documents;
- G. Become aware of the general nature of work (if any) to be performed by OWNER and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. Correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies and data with the Bidding Documents;

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

#### ARTICLE 7 - PRE-BID CONFERENCE

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

#### ARTICLE 8 - SITE AND OTHER AREAS

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

#### ARTICLE 9 - INTERPRETATIONS AND ADDENDA

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

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

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

#### ARTICLE 10 - BID SECURITY

- 10.01 A Bid must be accompanied by Bid security made payable to the OWNER in the amount of five percent of Bidder's maximum Bid price and in the form of certified check or Bid Bond.
- 10.02 Bid Bond shall be on the form bound in the Project Manual. Bid Bond shall be issued by a surety meeting the requirements of paragraphs 5.01 and 5.02 of the General Conditions. The Bid Bond must contain original signatures in ink. Pencil, stamped, thermal faxed, Xeroxed, or any other copies of the signature shall be grounds for voiding the Bid.
- 10.03 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to sign and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, OWNER may annul the Notice of Award and the Bid security of that Bidder will be forfeited to the OWNER as liquidated damages for such failure.
- 10.04 The Bid security of the three lowest bidders may be retained by OWNER until the earlier of the seventh day after the Effective Date of the Agreement or the forty-first day after the Bid opening whereupon the Bid security furnished by such Bidders will be returned. The Bid security of Bidders whom OWNER believes do not have a reasonable chance of receiving an award will be returned within seven days of the Bid opening.

## ARTICLE 11 - CONTRACT TIMES

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

## ARTICLE 12 - LIQUIDATED AND SPECIAL DAMAGES

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

## ARTICLE 13 - SUBSTITUTE AND "OR EQUAL" ITEMS

- 13.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or-equal" items. Whenever it is specified or described in the Bidding Documents that a substitute or "or-equal" item of material or equipment may be furnished or used by CONTRACTOR if acceptable to ENGINEER, application for such acceptance will not be considered by ENGINEER until after the Effective Date of the Agreement. The procedure for submittal of any such application by CONTRACTOR and consideration by ENGINEER is set forth in the General Conditions which may be supplemented in the General Requirements.
- 13.02 Refer to Section 01 25 00 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. Section 139 of State Finance Law.
  - F. Bidder’s Qualification Statement, including Attachments A, B, C and D
  - G. 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-responsible. OWNER also reserves the right to waive any informality not involving price, time or changes in the Work, if it is deemed to be in the best interest of the OWNER. The Bidder will not be allowed to take advantage of any error or omission.
- 22.02 OWNER reserves the right to reject any Bid not accompanied by specified documentation and Bid security. In the event that OWNER requires more than 45 calendar days after the actual Bid opening date to award the contract, Bidders shall provide to ENGINEER written Consent of Surety of the Bid Bond.
- 22.03 OWNER reserves the right to reject any Bid that, in its sole discretion, is considered to be unbalanced or unreasonable as to the amount bid for any lump sum or unit price item.
- 22.04 In evaluating Bidders, OWNER will consider their qualifications whether or not their Bids comply with the prescribed requirements, the alternatives, if any, the lump sum and unit prices, and other data as may be requested in the Bid Form or prior to the Notice of Award.
- 22.05 OWNER may consider the qualifications and experience of Subcontractors, Suppliers and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers and other individuals or entities must be submitted as provided in the Supplementary Conditions.
- 22.06 OWNER may conduct such investigations as OWNER deems necessary to establish the responsibility, qualifications and financial ability of the Bidders to perform the Work in accordance with the Contract Documents. OWNER reserves the right to reject the Bid of any Bidder who does not pass any such evaluation to OWNER'S satisfaction.
- 22.07 OWNER reserves the right to accept any Bid deemed to be in its best interests even though the Bid chosen may result in the award of the Contract to a Bidder whose Bid is not, on a mathematical basis alone, the low Bid.

- 22.08 The OWNER may elect not to award a contract at this time due to budgetary or other considerations. OWNER reserves the right to reject any or all proposals and to re-bid the contract if the OWNER deems it in the public interest to do so.
- 22.09 Contracts shall be awarded only pursuant to resolution.
- 22.10 OWNER reserves the right to reject any bids from Bidders who are in arrears to, or in litigation with, the Erie County Water Authority or the County of Erie upon any debt or contract, or in default as surety or otherwise upon any obligation of the Erie County Water Authority or the County of Erie.

#### ARTICLE 23 - CONTRACT SECURITIES

- 23.01 Performance Bond shall be in the form of Engineers Joint Contract Documents Committee (EJCDC) "Construction Performance Bond", 1910-28-A. Payment Bond shall be in the form of EJCDC "Construction Payment Bond", 1910-28-B. The amounts of and other requirements for Performance and Payment Bonds are stated in paragraph 5.01 of the General Conditions. The requirements for delivery of Bonds are stated in paragraph 2.01 of the General Conditions. Additional requirements may be stated in the Supplementary Conditions.
- 23.02 Successful Bidder shall within five days from the date of the Notice of Award deliver to OWNER, for OWNER'S review and approval, the Performance Bond and the Payment Bond CONTRACTOR proposes to furnish at the time of the execution of the Agreement.

#### ARTICLE 24 – CONTRACTOR'S INSURANCE

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

#### ARTICLE 25 - SIGNING OF AGREEMENT

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

ARTICLE 26 - NOTICE TO PROCEED

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

ARTICLE 27 - PARTNERING (NOT USED)

ARTICLE 28 - SALES AND USE TAXES

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

ARTICLE 29 - ADDITIONAL REQUIREMENTS

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

END OF SECTION

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ERIE COUNTY WATER AUTHORITY  
BUFFALO, NEW YORK

CONTRACT NO: OBG-12A  
STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT  
PROJECT NO: 201500169

(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: OBG-12A  
Sturgeon Point and Van de Water Improvements Project  
Project No. 201500169

BID TO:

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

BID FROM: H&K SERVICES, INC.

(Print or Type Name of Bidder)

(/A Corporation/A Partnership/A Limited Liability Company/A  
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: OBG-12A  
 STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT**

**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>
<u>1</u>	<u>10/24/16</u>	<u>          </u>	<u>          </u>
<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
<u>          </u>	<u>          </u>	<u>          </u>	<u>          </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 effect 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,**

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

- F. Bidder does not consider that any further examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance of the Work at the price(s) and within the times and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents and all additional examinations, investigations, explorations, tests, studies and data with the Bidding Documents.
- I. Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by ENGINEER is acceptable to Bidder.
- J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.
- K. The quantities for the unit price items are unpredictable and the ENGINEER has inserted certain quantities in the proposal to be used solely for purpose of comparison of bids.
- L. Fixed minimum unit prices may have been established for some of the items in the Bid. The prices represent the minimum amounts, which will be paid the CONTRACTOR for these items. The Bidder shall include a price not less than the stated minimum. If in the opinion of the Bidder these prices do not reflect the actual value of the work involved, the Bidder may void the given fixed minimum unit price for that specific item and enter a higher unit price in the spaces provided in the Bid Form sheets. Bidder's Proposals received which include a unit price less than the stated minimum shall be adjusted to meet the fixed minimum unit price.

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4.01 Bidder further represents that this Bid is genuine and is not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding; Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER; and that no person or persons acting in any official capacity for the OWNER are directly or indirectly interested in this Bid, or in any portion of the profit thereof.

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

Description	Estimated Quantities	Computed Totals
Item 1 - Chemical Systems <i>One million two hundred thousand</i> _____ Dollars and <i>no</i> _____ Cents (\$1,200,000 ) Lump Sum	1 LS	\$ <u>1,200,000</u> <sup>00</sup>
Item 2- NOT USED		
Item 3- Plant Water System <i>Three hundred sixty nine thousand</i> <i>nine hundred</i> _____ Dollars and <i>no</i> _____ Cents (\$369,900 <sup>00</sup> ) Lump Sum	1 LS	\$ <u>369,900</u> <sup>00</sup>

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Item 4- Hazardous Material Abatement

Thirty two thousand Dollars  
and no Cents  
(\$ 32,000 ) Lump Sum 1 LS \$ 32,000<sup>00</sup>

Item 5- Coagulation Basins

Five hundred twenty seven thousand Dollars  
and no Cents  
(\$ 527,000<sup>00</sup> ) Lump Sum 1 LS \$ 527,000<sup>00</sup>

Item 6- Sludge Collector Repairs

Item 6A - Repair Stainless Steel Glide Strips

Twenty two Dollars  
and no Cents  
(\$ 22.00 ) Per Linear Foot 4,200 LF \$ 92,400<sup>00</sup>

Item 6B - UHMW Glide Strips

Thirty seven Dollars  
and no Cents  
(\$ 37.00 ) Per Linear Foot 4,400 LF \$ 162,800<sup>00</sup>

Item 6C - Replace Stainless Steel Glide Strips

Twenty Dollars  
and no Cents  
(\$ 20.00 ) Per Linear Foot 4,200 LF \$ 84,000<sup>00</sup>

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Item 7- Concrete Repair

Item 7A - Surface Repair

Thirty five Dollars

and no Cents  
(\$ 35.00 ) Per Square Feet

100 SF \$ 3,500<sup>00</sup>

Item 7B - Joint Repair

Thirty one Dollars

and no Cents  
(\$ 31.00 ) Per Linear Foot

200 LF \$ 6,200<sup>00</sup>

Item 8- Miscellaneous Improvements Allowance:

Two hundred fifty thousand Dollars

and no Cents

1 AL \$ 250,000

Item 9 - Security Allowance

Twenty five thousand Dollars

and no Cents

1 AL \$ 75,000

Item 10 - NOT USED

Item 11 - Control System Integration Allowance:

One hundred twenty five thousand Dollars

and no Cents

1 AL \$ 125,000

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Item 12 - Potassium Permanganate Pump Allowance:

Ninety Thousand Dollars

and no Cents

1 AL

\$ 30,000

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

\$2,957,800<sup>00</sup>  
(Figures)

Two million nine hundred fifty seven thousand  
eight hundred Dollars and no Cents  
(Written Amount)

**ERIE COUNTY WATER AUTHORITY  
CONTRACT NO: OBG-12A  
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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 5% OF BID AMOUNT Dollars (\$\_\_\_\_\_).
- B. Section 2875 of the Public Authorities Law, Ground for Cancellation of Contract by Public Authority.
- C. Section 2876 of the Public Authorities Law, Disqualification to Contract with Public Authority.
- D. Section 2878 of the Public Authorities Law, Non-Collusive Bidding Certification.
- E. Section 139 of State Finance Law, Lobbying.
- F. Required Bidder Qualifications Statement with supporting data.
- G. 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 OCTOBER 25, 2018.

**ERIE COUNTY WATER AUTHORITY  
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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.: \_\_\_\_\_

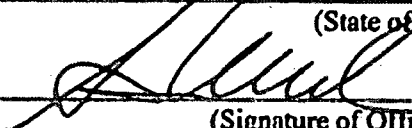


ERIE COUNTY WATER AUTHORITY  
CONTRACT NO: OBG-12A  
STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT

A Corporation

By H&K SERVICES, INC.  
(Corporation Name)

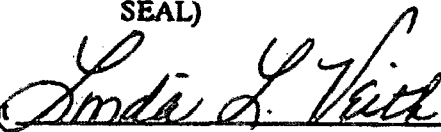
STATE OF NEW YORK  
(State of Incorporation)

By   
(Signature of Officer Authorized to Sign)

SCOT HIRSCHMAN, PRESIDENT  
(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:  
12025 LEON ROAD  
LEON, NY 14751

Phone No.: 716-298-5290 FAX No.: 716-298-8142

**ERIE COUNTY WATER AUTHORITY  
CONTRACT NO: OBG-12A  
STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT**

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: OBG-12A  
STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT**

**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: OBG-12A  
STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT  
PROJECT No: 201500169**

**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**

**Section 139 of State Finance Law**

BID SECURITY FORM

BIDDER (Name and Address):

H&K SERVICES, INC.  
12025 Levan Rd, Leon NY 14751

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

Hudson Insurance Company  
100 Williams St 5th Fl, New York NY 10038

OWNER:

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

BID

BID DUE DATE: 10/25/16

PROJECT:

Contract No: OBG-12A  
Sturgeon Point and Van de Water Improvements Project  
Project No: 201500169

BOND

BOND NUMBER: NA

DATE: (Not later than Bid due date): 10/25/16

PENAL SUM: Five Percent of the amount bid-- 5%  
(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

H&K SERVICES, INC. (Seal)  
Bidder's Name and Corporate Seal

Hudson Insurance Company (Seal)  
Surety's Name and Corporate Seal

By: [Signature] Signature and Title Scot Hirschman, President

By: [Signature] Signature and Title Jason N Read Attorney-in-Fact (Attach Power of Attorney)

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

Witness Attest: [Signature] Dina M Marinaro

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.
- 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 3.01 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**

**ACKNOWLEDGEMENT OF PRINCIPAL**

STATE OF NEW YORK  
COUNTY OF ERIE

On the 25th of October in the year 2016, before me personally came Scot Hirschman to me known, who, being by me duly sworn, did depose and say that he/she/they reside(s) in Coneawango Valley, NY that he/she/they (is) (are) the President of H&K Services Inc the corporation described in and which executed the above instrument; that he/she/they know the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that it was so affixed by authority of the board of directors of said corporation, and that he/she/they signed his/her/their name(s) thereto by like authority.

*Linda L. Veith*  
Notary Public

LINDA L. VEITH  
Notary Public of New York  
Qualified in Cattaraugus Co.  
Commission Expires: Dec 21, 2018  
No 01VE6017824

**ACKNOWLEDGEMENT OF SURETY**

STATE OF NEW YORK  
COUNTY OF Erie

On the 25th day of October in the year 2016, before me personally came Jason N reid all who, being by me duly sworn, did depose and say that he/she/they reside(s) Erie Co NY, that he/she/they (is) (are) the Attorney-in-Fact duly appointed of Hudson Insurance Company the corporation described in and which executed the above instrument; that he/she/they know the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that it was affixed by authority of the board of directors of said corporation, and that he/she/they signed his/her/their names(s) thereto by like authority.

*Dina M. Martino*  
Notary Public

DINA M MARTINO  
Notary Public, State of New York  
No. 01MAS283482  
Qualified in Erie County  
Commission Expires 07/08 /2017



**BID BOND POWER OF ATTORNEY**

KNOW ALL MEN BY THESE PRESENTS: That HUDSON INSURANCE COMPANY, a corporation of the State of Delaware, with offices at 100 William Street, New York, New York, 10038, has made, constituted and appointed, and by these presents, does make, constitute and appoint

William J. Quinn, Thomas J. Vanner,  
Ralph J. Vanner, Jr., Dina M. Marinaro and Jason Reid

its true and lawful Attorney(s)-in-Fact, at New York City in the State of New York, each of them alone to have full power to act without the other or others, to make, execute and deliver on its behalf, as Surety, bid bonds for any and all purposes.

Such bid bonds, when duly executed by said Attorney(s)-in-Fact, shall be binding upon said Company as fully and to the same extent as if signed by the President of said Company under its corporate seal attested by its Secretary.

In Witness Whereof, HUDSON INSURANCE COMPANY has caused these presents to be of its Executive Vice President thereunto authorized, on this 3rd day of March, 2014 at New York, New York.



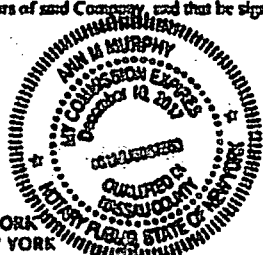
Attest  
Dina Marinaro, Corporate Secretary

HUDSON INSURANCE COMPANY  
By Christopher T. Suarez, Executive Vice President

STATE OF NEW YORK  
COUNTY OF NEW YORK      SS.

On the 3rd day of March, 2014 before me personally came Christopher T. Suarez to me known, who being by me duly sworn did depose and say that he is an Executive Vice President of HUDSON INSURANCE COMPANY, the Company described herein and which executed the above instrument, that he knows the seal of said Company, that the seal affixed to said instrument is the corporate seal of said Company, that it was so affixed by order of the Board of Directors of said Company, and that he signed his name thereto by like order.

(Notarial Seal)



ANN M. MURPHY  
Notary Public, State of New York  
No. 01MU6067553  
Qualified in Nassau County  
Commission Expires December 10, 2017

**CERTIFICATION**

STATE OF NEW YORK  
COUNTY OF NEW YORK

The undersigned Dina Marinaro hereby certifies

THAT the original resolution, of which the following is a true and correct copy, was duly adopted by unanimous written consent of the Board of Directors of Hudson Insurance Company dated July 27<sup>th</sup>, 2007, and has not since been revoked, amended or modified

"RESOLVED, that the President, the Executive Vice Presidents, the Senior Vice Presidents and the Vice Presidents shall have the authority and discretion: to appoint such agent or agents, or attorney or attorneys-in-fact, for the purpose of carrying on this Company's surety business, and to empower such agent or agents, or attorney or attorneys-in-fact, to execute and deliver, under this Company's seal or otherwise, bonds obligations, and recognizances, whether made by this Company as surety thereon or otherwise, indemnity contracts, contracts and certificates, and any and all other contracts and undertakings made in the course of this Company's surety business, and renewals, extensions, agreements, waivers, consents or stipulations regarding undertakings so made; and

FURTHER RESOLVED, that the signature of any such Officer of the Company and the Company's seal may be affixed by facsimile to any power of attorney or certificate given for the execution of any bond, undertaking, recognizance, contract of indemnity or other written obligation in the nature thereof or related thereto, such signature and seal when so used whether heretofore or hereafter, being hereby adopted by the Company as the original signature of such officer and the original seal of the Company, to be void and binding upon the Company with the same force and effect as though manually affixed"

THAT the above and foregoing is a full, true and correct copy of Power of Attorney issued by said Company, and of the whole of the original and that the said Power of Attorney is still in full force and effect and has not been revoked, and furthermore that the Resolution of the Board of Directors set forth in the said Power of Attorney is now in force



Form HUD B 2010 (v1)

Witness the hand of the undersigned and the seal of said Company this 25th day of October, 2016  
By Dina Marinaro  
Dina Marinaro, Corporate Secretary



**HUDSON INSURANCE COMPANY**  
**SHORT FORM FINANCIAL STATEMENT**  
**AS OF DECEMBER 31, 2015**

**ASSETS**

Bonds	\$	313,923,605
Real estate		0
Cash on hand and on deposit		35,537,494
Reinsurance Receivable		200,109,086
FIT recoverable (including net deferred tax asset)		34,744,519
Aggregate write-ins for other than invested assets		192,627,845
Deferred premiums, agents' balances and installments booked but deferred and not yet due (including earned but unbilled premiums)		35,713,328
Stocks		245,607,541
Other Assets		24,533,005
	\$	1,082,816,422

**LIABILITIES & SURPLUS**

Losses	\$	146,286,447
Loss adjustment expense		18,454,858
Other expenses		28,091,293
Unearned premiums		40,802,657
Ceded reinsurance premiums payable		310,160,451
Payable to parent, subsidiaries and affiliates		13,569,855
Commissions payable, contingent commissions and other similar charges		13,282,926
Other Liabilities		34,229,922
	\$	624,948,359
Preferred and Common capital stock	\$	7,500,238
Gross paid in and contributed surplus		293,480,097
Unassigned funds (surplus)		156,887,729
Surplus as regards policyholders	\$	457,868,064
	\$	1,082,816,423

STATE OF NEW YORK )  
COUNTY OF NEW YORK )

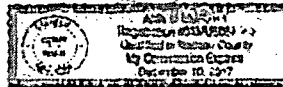
I, the undersigned Senior Vice President and Chief Financial Officer of Hudson Insurance Company hereby certify the foregoing to be a short form financial statement in the form of a balance sheet, showing the Company's assets and liabilities on a provisional basis, at the close of business on December 31, 2015.

IN TESTIMONY WHEREOF, I have set my hand and affixed the seal of the Company, this 2nd day of March, 2016.



Subscribed and sworn to before me this 2nd day of March 2016.  
My commission expires \_\_\_\_\_

John Verbich  
John Verbich  
Senior Vice President and Chief Financial Officer



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.

H&K SERVICES, INC.

(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.

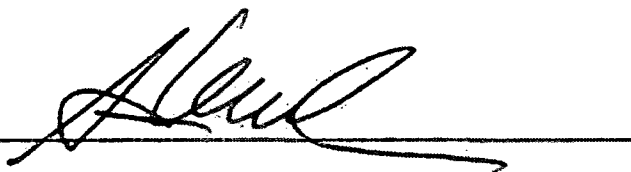
The fact that a bidder (a) has published price lists, rates, or tariffs covering items to be procured, (b) has informed prospective customers of proposed or pending publication of new or revised price lists for such items, or (c) has sold the same items to other customers at the same prices being bid, 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.

H&K SERVICES, INC.

(Name of Individual, Partnership, or Corporation)

By

A handwritten signature in black ink, appearing to read "Alen", is written over a horizontal line.

(SEAL)

**FORMS A, B, and C**

**SECTION 139 OF STATE FINANCE LAW**

Pursuant to State Finance Law §§139-j and 139-k, this Invitation to Bid includes and imposes certain restrictions on communications between a Governmental Entity and an Offerer/bidder during the procurement process. An Offerer/bidder is restricted from making contacts from the earliest notice of intent to solicit offers, through final award and approval of the Procurement Contract by the Governmental Entity. The designated contact is identified in the Notice to Bidders. Governmental Entity employees are also required to obtain certain information when contacted during the restricted period and make a determination of the responsibility of the Offerer/bidder pursuant to these two statutes. Certain findings of non-responsibility can result in rejection for contract award and in the event of two findings within a 4-year period, the Offerer/bidder is debarred from obtaining governmental Procurement Contracts. 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.

**Form A - Offerer's Affirmation of Understanding of and Agreement pursuant to State Finance Law.**

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

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

**Contract Termination Provision.**

**FORM A**

**Offerer's Affirmation of Understanding of and Agreement Pursuant to State  
Finance Law §139-j(3) and §139-j(6)(b)**

**Instructions:**

A Governmental Entity must obtain the required affirmation of understanding and agreement to comply with procedures on procurement lobbying restrictions regarding permissible contacts 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 Government Entity relative to permissible contacts as required by State Finance Law §139-j(3) and §139-j(6)(b).

By:  Date: 10/25/2016

Name: SCOT HIRSCHMAN

Title: PRSIDENT

Contractor Name: H&K SERVICES, INC.

Contractor Address: \_\_\_\_\_  
12025 LEON ROAD  
LEON, NY 14751

**FORM B**

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

**Instructions:**

A Governmental Entity must obtain the required Certification that the information 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 the Certification and provide it to the procuring Governmental Entity. It is required that the Certification 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 Governmental Entity with respect to State Finance Law §139-k is complete, true, and accurate.*

By:  Date: 10/25/2016

Name: SCOT HIRSCHMAN

Title: PRESIDENT

Contractor Name: H&K SERVICES, INC.

Contractor Address: 12025 LEON ROAD  
LEON, NY 14751



**FORM C****Offerer's Disclosure of Prior  
Non-Responsibility Determinations****Background:**

New York State Finance Law §139-k(2) obligates a Governmental Entity 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-k(1). State Finance Law §139-j sets 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 within the necessary timeframe. See State Finance Law §139-j(10)(b) and §139-k(3).

**Instructions:**

A Governmental Entity 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 Governmental Entity 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:

H&K SERVICES, INC.

Address: 12025 LEON ROAD, LEON NY 14751

Name and Title of Person Submitting this Form: \_\_\_\_\_

SCOT HIRSCHMAN, PRESIDENT

Contract Procurement Number: OBG-12A

Date: 10/25/16

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 Governmental Entity with respect to State Finance Law §139-k is complete, true, and accurate.

By:  Date: 10/25/16  
Signature

Name: SCOT HIRSCHMAN

Title: PRESIDENT

### **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-k(1).

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 Governmental Entity is required to include a statement in the procurement record describing the basis for any action taken under the termination provision.

#### **Sample Contract Termination Provision**

The 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 Governmental Entity may exercise its termination right by providing written notification to the Offerer in accordance with the written notification terms of this contract.

**END OF BID FORM SUPPLEMENTS**

ERIE COUNTY WATER AUTHORITY  
BUFFALO, NEW YORK

CONTRACT NO: OBG-12A  
STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT  
PROJECT NO: 201500169

SECTION 00450

BIDDER'S QUALIFICATION STATEMENT

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

SUBMITTED TO:

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

SUBMITTED FOR:

Erie County Water Authority  
Contract No: OBG-12A  
Sturgeon Point and Van de Water Improvements Project  
ECWA Project No. 201500169

SUBMITTED BY:

Name of Organization: H&K SERVICES, INC.  
(Print or Type Name of Bidder)

Name of Individual: SCOT HIRSCHMAN

Title: PRESIDENT

Business Address: 12025 LEON ROAD, LEON NY 14751

Telephone No.: 716-296-5290

Fax No.: 716-296-8142

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:

JUNE 2001 - STATE OF NEW YORK

B. List of Executive Officers:

Name	Title
SCOT HIRSCHMAN	PRESIDENT
LINDA L VEITH	SECRETARY

If Partnership:

A. Date and State of Organization:

B. Names of Current General Partners:

C. Type of Partnership

General  Publicly Traded  
 Limited  Other (described): \_\_\_\_\_

If Joint Venture:

A. Date and State of Organization:

\_\_\_\_\_  
\_\_\_\_\_

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

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

If Sole Proprietorship:

A. Date and State of Organization:

\_\_\_\_\_  
\_\_\_\_\_

B. Name and Address of Owner or Owners:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- 2.0 How many years has your organization been in business as a general contractor? 15
- 3.0 If your organizational structure has changed within the past five years, provide data as listed above in Item 1.0 for your previous organization. n/a
- 4.0 We normally perform 80% percent of the work with our own forces. List work normally subcontracted.
- 5.0 Has any construction contract to which you have been a party been terminated by the owner; have you ever terminated work on a project prior to its completion for any reason; has any surety which issued a performance bond on your behalf ever completed the work in its own name or financed such completion on your behalf; has any surety expended any monies in connection with a contract for which they furnished a bond on your behalf? 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. No

- 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? 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. *no*
- 7.0 In the last five years, has your organization, or any predecessor organization, failed to substantially complete a project in a timely manner? 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. *no*
- 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. *New York*
- 12.0 Provide the following for your surety:
- 12.1 Surety Company: HUDSON INSURANCE GROUP
- 12.2 Agent: VANNER INSURANCE
- A. Address: 11 PINCHOT CT, AMHERST NY
- B. Telephone No.: 716-688-8888



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: COMMUNITY BANK

13.2 Address: 1 W FAIRMOUNT AVE, LAKEWOOD NY 14751

13.3 Account Manager: DAVID ALM

13.4 Telephone No.: 716-763-3203

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 LEON NY, this 25 day of OCTOBER, 2016.

Bidder: H&K SERVICES INC.

(Print or Type Name of Bidder)

By: 

SCOT HIRSCHMAN

Title: PRESIDENT

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)-----

SCOT HIRSCHMAN being duly sworn, deposes and says that:  
a) he/she is PRESIDENT of H&K SERVICES, INC.;  
(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)-----

Scot Hirschman being duly sworn, deposes and says  
that he/she is President of H&K Services Inc;  
(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 25 day of OCTOBER, 2016, in the  
County of CATTARAUGUS, State of NEW YORK.

Linda L. Veith  
(Notary Public)

My commission expires 12.21.18

(Seal)

LINDA L. VEITH  
Notary Public of New York  
Qualified in Cattaraugus Co.  
Commission Expires: Dec 21, 2018  
No. 01VE6017824

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>
ATTACHED						

Contract OBG-12A

00450.7

Bidder's Qualification Statement  
Rev. 1/03

**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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ATTACHED

Contract OBG-12A

00450.8

Director's Qualification Statement,  
Rev. 10/05

**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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Contract OIG-12A

004509

Bidder's Qualification Statement,  
Rev. 10/03

**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

**NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE  
ATTACHMENT A - COMPLETED CONSTRUCTION CONTRACTS**

EIN: 16-1607770

Question 30: List the ten most recent construction contracts the Business Entity has completed. If less than ten, include most recent subcontractors projects up to that number.						
Agency/Owner	Telephone No.	Design Architect and/or Design Engineer	Award Date	Amount	Date Completed	
1. Agency/Owner NESTLE PURINA						
Contact Person PAUL ZEBRASKI	(716) 363-8616	Design Architect and/or Design Engineer NESTLE PURINA	9/18/2015	506,065.00	12/17/2015	
Contract No.	Prime or Sub P	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable			
2. Agency/Owner CATTARAUGUS COUNTY DPW						
Contact Person WILLIAM FOX	(716) 938-2439	Design Architect and/or Design Engineer CATTARAUGUS COUNTY DPW	7/23/2015	684,685.	11/30/2015	
Contract No.	Prime or Sub P	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable			
3. Agency/Owner CITY OF JAMESTOWN						
Contact Person MARK ROETZER	(716) 483-7611	Design Architect and/or Design Engineer CITY OF JAMESTOWN	6/6/2015	108,200.00	10/31/2015	
Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable			
4. Agency/Owner SUNY FREDONIA						
Contact Person KEVIN CLOOS	(716) 673-3722	Design Architect and/or Design Engineer SUNY FREDONIA	5/28/2015	94,400.00	10/15/2015	
Contract No. T000266	Prime or Sub P	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable			
5. Agency/Owner CITY OF DUNKIRK						
Contact Person	(716) 366-9832	Design Architect and/or Design Engineer	5/27/2015	34,496.00	9/16/2015	
Contract No. 20150907	Prime or Sub P	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable			

**NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE  
ATTACHMENT A - COMPLETED CONSTRUCTION CONTRACTS**

EIN: 16-1607770

Question 3.0: List the ten most recent construction contracts the Business Entity has completed. If less than ten, include most recent subcontracts on projects up to that number.						
6.	Agency/Owner JAMESTOWN BPU	Telephone No. (716) 661-1660	Design Architect and/or Design Engineer INSCALE P.C.	Award Date 5/15/2015	Amount 53,400.00	Date Completed 6/9/2015
	Contact Person RANDY PETERSON	Prime or Sub P	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable		
7.	Agency/Owner CATTARAUGUS COUNTY DPW	Telephone No. (716) 938-2439	Design Architect and/or Design Engineer HUNT ENGINEERS	Award Date 9/3/2014	Amount 798,495.40	Date Completed 12/27/2015
	Contact Person WILLIAM FOX	Prime or Sub P	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable		
8.	Agency/Owner CHAUTAQUA LAKE SEWER DISTRICT	Telephone No. (716) 664-9727	Design Architect and/or Design Engineer GDH	Award Date 4/4/2014	Amount 189,950.00	Date Completed 10/31/2014
	Contact Person JAMES MURPHY	Prime or Sub P	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable		
9.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Design Architect and/or Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable		
10.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Design Architect and/or Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable		



NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE  
 ATTACHMENT B - UNCOMPLETED CONSTRUCTION CONTRACTS

EIN: 16-1607770

Question 3.1: List all current uncompleted construction contracts.

Agency/Owner	Award Date	Amount	Date Completed
1. Agency/Owner NORTHEAST BOROUGH	12/16/2015	298,000.00	6/30/2016
Contact Person GUS MAAS	Telephone No. (814) 725-8659	Design Architect and/or Design Engineer HILL ENGINEERING	
Contract No. 1-2015	Prime or Sub P	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable
	Total Contract Amount 298,000.00	Amount Sublet to Others 12,146.00	Uncompleted Amount 14,490.00
2. Agency/Owner CHAUTAUQUA COUNTY DPF	Award Date 10/1/2015	Amount 198,600.00	Date Completed 7/30/2016
Contact Person MARY KAY GENTNER	Telephone No.	Design Architect and/or Design Engineer PASSERO ASSOCIATES	
Contract No. 5905.XX	Prime or Sub P	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable
	Total Contract Amount 198,600.00	Amount Sublet to Others 24,391.00	Uncompleted Amount 14,519.00
3. Agency/Owner CITY OF DUNKIRK	Award Date 5/1/2015	Amount 674,600.00	Date Completed 3/17/2016
Contact Person GUS MAAS	Telephone No. (814) 725-8659	Design Architect and/or Design Engineer HILL ENGINEERING	
Contract No. 1-2015	Prime or Sub P	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable
	Total Contract Amount 674,600.00	Amount Sublet to Others 0.00	Uncompleted Amount 74,482.00
4. Agency/Owner NYS OGS	Award Date 3/12/2015	Amount 2,917,000.	Date Completed 3/10/2018
Contact Person NICKPOUPALOS	Telephone No. (716) 532-5151	Design Architect and/or Design Engineer NYS OGS	
Contract No. 44674-C	Prime or Sub P	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable
	Total Contract Amount 2,917,000.00	Amount Sublet to Others 458,271.00	Uncompleted Amount 1,200,302.70

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE  
 ATTACHMENT B - UNCOMPLETED CONSTRUCTION CONTRACTS

EIN: 16-1607770

Question 3.1: List all current uncompleted construction contracts.										
Agency/Owner	Award Date	Amount	Date Completed	Telephone No.	Design Architect and/or Design Engineer	Prime or Sub	Joint Venture (JV) Name, if applicable	EIN of JV, if applicable	Uncompleted Amount	Date Completed
5. NYS OGS	6/5/2014	1,225,400.	11/26/2015	(716) 532-5151	Design Architect and/or Design Engineer NYS OGS	P			28,190.00	
6. PLEASANT TOWNSHIP		Total Contract Amount 1,225,400.00								
Contact Person JEFFREY HOLCOMB		Amount Sublet to Others 339,930.00		(814) 362-5546	Design Architect and/or Design Engineer E&M ENGINEERS & SURVEYORS PC	P				
Contract No. 44674-C		Award Date 4/5/2016	8/5/2016							
7. VILLAGE OF CASSADAGA		Total Contract Amount 66,230.00								
Contact Person JOHN P SCHEPP		Amount Sublet to Others 218,200.00		(585) 227-6040	Design Architect and/or Design Engineer CHATFIELD ENGINEERS	P				
Contract No. 15-1130		Award Date 4/22/2016								
8. NORWICH TOWNSHIP		Total Contract Amount 218,200.00								
Contact Person JASON SHURA		Amount Sublet to Others 53,888.00		(814) 696-6280	Design Architect and/or Design Engineer STIFFLER, MCGRAW & ASSOCIATES	P				
Contract No. 15-9004		Award Date 6/8/2016								

**NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE  
ATTACHMENT B - UNCOMPLETED CONSTRUCTION CONTRACTS**

EIN: 16-1607770

Question 3.1: List all current uncompleted construction contracts.						
Agency/Owner	Award Date	Amount	Date Completed	Telephone No.	Design Architect and/or Design Engineer	EIN of JV, if applicable
9. VILLAGE OF WESTFIELD	6/24/2016	3,639,000.		(716) 688-0766	WENDAL	
Contact Person RYAN LANINGA				Joint Venture (JV) Name, if applicable		
Contract No. 01-01-14483				Total Contract Amount	Amount Sublet to Others	Uncompleted Amount
				3,639,000.00		3,639,000.00
10. Agency/Owner	Award Date	Amount	Date Completed	Telephone No.	Design Architect and/or Design Engineer	
Contact Person				Joint Venture (JV) Name, if applicable		EIN of JV, if applicable
Contract No.				Total Contract Amount	Amount Sublet to Others	Uncompleted Amount
Grand Total All Uncompleted Contracts						\$5,452,713.70

**KEY PERSONNEL**

**Scot Hirschman, PE – Project Manager / President**

Thirty one years of experience in project management of construction projects including bridge, water, wastewater, utility and various other public works projects.

**Bill Hirschman, PE – Project Manager**

Six years of experience in project management of construction projects including bridge, water, wastewater, utility and various other public works projects.

**Kurt Hirschman – General Superintendent / Vice President**

Twenty Nine years of experience in on-site supervision of construction projects including bridge, water, wastewater, utility and various other public works projects.

**Brad Hirschman – Superintendent**

Thirty years of experience in on-site supervision of construction projects including bridge, water, wastewater, utility and various other public works projects.

U.S. Department of Labor  
Occupational Safety and Health Administration

Inspection Number: 690038  
Inspection Date(s): 10/17/2012 - 10/17/2012  
Issuance Date: 10/22/2012



**Citation and Notification of Penalty**

Company Name: H & K Services Inc.  
Inspection Site: 1715 Whalgren Road, Frewsburg, NY 14738

**Citation 1 Item 1** Type of Violation: **Serious**

29 CFR 1926.502(b)(1): The top edge height of the top rails, or equivalent guardrail system members, was not 42 inches (1.1 m) plus or minus 3 inches (8 cm) above the walking/working level:

a) On or about 10/17/12 at the Frewsburg Water District Well #5 project located at 1715 Whalgren Road, Frewsburg, New York; the side walls of a new concrete tank, that was 8 feet deep, were only 29" above grade.

**NO ABATEMENT CERTIFICATION REQUIRED**

Date By Which Violation Must be Abated:  
Proposed Penalty:

Corrected During Inspection  
\$1600.00

A handwritten signature in black ink, appearing to read "Arthur Dube", written over a horizontal line.

Arthur Dube  
Area Director

10/22/2012  
CO: \_\_\_\_\_

See pages 1 through 4 of this Citation and Notification of Penalty for information on employer and employee rights and responsibilities.

ERIE COUNTY WATER AUTHORITY  
BUFFALO, NEW YORK

CONTRACT No: OBG-12A  
STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT  
PROJECT No: 201500169

SECTION 00500

AGREEMENT

THIS AGREEMENT is dated as of the 10<sup>th</sup> day of January in the year 2017, by and between the ERIE COUNTY WATER AUTHORITY (hereinafter called OWNER) and H&K SERVICES, Inc. (hereinafter called CONTRACTOR).

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

ARTICLE 1 - WORK

1.01 CONTRACTOR shall at its own cost and expense furnish all labor, services, tools, materials, equipment and incidentals necessary to complete all Work as specified or indicated in the Contract Documents to perform all specified work required for the demolition of a portion of the EPDM baffle walls and installation of concrete bench walls in Flocculation Basin Nos. 1 through 5; installation of 12-inch slide gates in Flocculation Basin Nos. 3, 4 and 5, removal and disposal of sludge in the Coagulation Basin Influent Channel; installation of access hatches and sampling ports on Sedimentation Basin Nos. 1 through 5; repair of the SuperScraper assemblies in Sedimentation Basin Nos. 1 through 5; replacement of the 20-inch drain valve and the 8-inch sludge draw-off isolation valve in Sedimentation Basin Nos. 1 through 5; installation of a new filter aid air compressor system; installation of three new caustic pumps; installation of three potassium permanganate tanks, mixers and associated piping; replacement of two hydrofluosilicic acid bulk storage tanks and associated piping; coating of the floors, walls and ceiling of the Fluoride Room; removal of two polyaluminum chloride bulk storage tanks; removal of one caustic soda bulk storage tank; separation of potable water systems from non-potable water systems at the WTP through the installation of RPZs and new piping; miscellaneous site demolition and restoration work; installation of new lighting in the Chemical Control Area; replacement of the heating and ventilation system in the Fluoride Room; miscellaneous structural modifications and repairs; miscellaneous painting; and miscellaneous electrical modifications at the Sturgeon Point Water Treatment Plant, Town of Evans. Under the same contract the Work includes the replacement of one hydrofluosilicic acid bulk storage tank and associated piping; and miscellaneous painting at the Van de Water

Treatment Plant, Town of Tonawanda. The Work includes restoration and all related work as shown on the drawings and described in the specifications.

## ARTICLE 2 - ENGINEER

- 2.01 The Project has been designed by O'Brien & Gere Engineers, Inc. who is hereinafter called the ENGINEER. O'Brien & Gere Engineers, 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 280 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 315 days from the date when the Contract Times commence to run.

## ARTICLE 4 - LIQUIDATED AND SPECIAL DAMAGES

### 4.01 Liquidated Damages

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

4.02 Special Damages:

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

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

ARTICLE 5 - CONTRACT PRICE

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

ARTICLE 6 - PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

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

6.02 Progress Payments; Retainage

- A. OWNER shall make monthly progress payments on account of the Contract Price on the basis of CONTRACTOR'S Applications for Payment as recommended by



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

1. Prior to Substantial Completion
  - a. Progress payments will be made in the amount of 95 percent of the Work completed, (with the balance being retainage), less the aggregate of payments previously made and less such amounts as ENGINEER shall determine, or OWNER may withhold, in accordance with paragraph 14.02 of the General Conditions; and
  - b. 95 percent of the cost of materials and equipment not incorporated in the Work but suitably stored (with the balance being retainage).
2. Upon Substantial Completion, OWNER shall pay an amount sufficient to increase total payments to CONTRACTOR to 100 percent of the Work completed, less such amounts as ENGINEER shall determine in accordance with paragraph 14.02.B.5 of the General Conditions and less 200 percent of ENGINEER'S estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

6.03 Final Payment:

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

ARTICLE 7 - INTEREST

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

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

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

- A. CONTRACTOR has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.
- B. CONTRACTOR has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance for the Work.
- C. CONTRACTOR is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work.
- D. CONTRACTOR has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions, and (2) reports and drawings of a Hazardous Environmental Condition identified at the Site, if any, which have been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions.
- E. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents to be employed by CONTRACTOR, and safety precautions and programs incident thereto.
- F. CONTRACTOR does not consider that any further examinations, investigations, explorations, tests, studies or data are necessary for the performance of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents.
- G. CONTRACTOR is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.
- I. CONTRACTOR has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that CONTRACTOR has discovered in the Contract

Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

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

#### ARTICLE 9 - CONTRACT DOCUMENTS

9.01 The Contract Documents consist of the following:

- A. This Agreement (10 pages).
- B. Performance Bond (2 pages).
- C. Payment Bond (2 pages).
- D. General Conditions (42 pages).
- E. Supplementary Conditions (9 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. The Drawings comprising a set entitled: Contract No: OBG-12A, Sturgeon Point and Van de Water Improvements Project.
- K. Addenda consisting of Numbers 1 to 1, inclusive.
- L. Exhibits to the Agreement enumerated as follows:
  - 1. Exhibit 1, Bid Form (12 pages).
- M. 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 1-12-17, 2017.

OWNER: Erie County Water Authority

CONTRACTOR: HEK SERVICES, INC.

By: Carl Z. Jan

By: [Signature]

Title: Chairman

Title: PRESIDENT

[CORPORATE SEAL]

[CORPORATE SEAL]

Attest Patricia Foley

Attest [Signature]

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: Earl L. Jenn

Title: Chairman

Address: 29.5 Main St Rm 350

Phone No.: 849-8484

Fax No.: 849-8467

Designated Representative:

Name: SCOT HIRSCHMAN

Title: PRESIDENT

Address: 12025 LEON RD LEON, NY 14751

Phone No.: 716-296-5290

Fax No.: 716-296-1814.2

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):  
H&K Services, Inc.  
12025 Leon Road, Leon, NY 14751

SURETY (Name and Address of Principal Place  
of Business): Hudson Insurance Company  
100 William St, 5th Floor, New York NY 10038

OWNER (Name and Address):  
  
Erie County Water Authority  
295 Main Street, Room 350  
Buffalo New York 14203

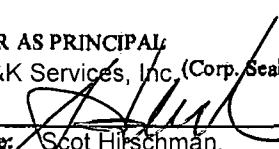
CONTRACT

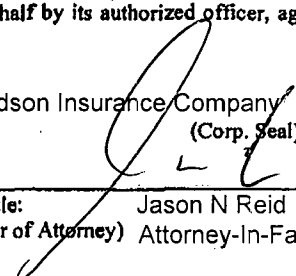
Date: 12/16/2016  
Amount: Two Million Nine Hundred Fifty Seven Thousand Eight Hundred and 00/100-----(2,957,800.00)  
Description: ERIE COUNTY WATER AUTHORITY  
CONTRACT NO: OBG-12A  
STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT  
PROJECT No. 201500169

BOND

Date (Not earlier than Contract Date): 12/20/2016  
Amount: Two Million Nine Hundred Fifty Seven Thousand Eight Hundred and 00/100-----(2,957,800.00)  
Modifications to this Bond Form: NA

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: H&K Services, Inc. (Corp. Seal)  
Signature:   
Name and Title: Scot Hirschman,  
President

SURETY Hudson Insurance Company  
Company: (Corp. Seal)  
Signature:   
Name and Title: Jason N Reid  
(Attach Power of Attorney) Attorney-In-Fact

(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 liability, 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 an 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 ASA1883-9073

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

CONTRACTOR (Name and Address):  
H&K Services, Inc.  
12025 Leon Road, Leon, NY 14751

SURETY (Name and Address of Principal Place  
of Business): Hudson Insurance Company  
100 William St, 5th Floor, New York NY 10038

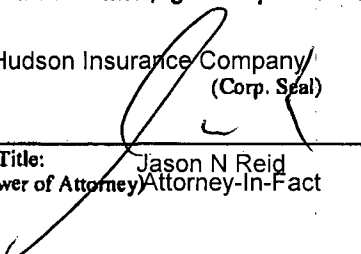
OWNER (Name and Address):  
Erie County Water Authority  
295 Main Street, Room 350  
Buffalo New York 14203

CONTRACT  
Date: 12/16/2016  
Amount: Two Million Nine Hundred Fifty Seven Thousand Eight Hundred and 00/100----- (2,957,800.00)  
Description: ERIE COUNTY WATER AUTHORITY  
CONTRACT NO: OBG-12A  
STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT  
PROJECT No. 201500169

BOND  
Date (Not earlier than Contract Date): 12/20/2016  
Amount: Two Million Nine Hundred Fifty Seven Thousand Eight Hundred and 00/100----- (2,957,800.00)  
Modifications to this Bond Form: NA

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: H&K Services, Inc. (Corp. Seal)  
Signature:   
Name and Title: Scot Hirschman,  
President

SURETY Hudson Insurance Company/  
Company: (Corp. Seal)  
Signature:   
Name and Title: Jason N Reid  
(Attach Power of Attorney) Attorney-In-Fact

(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):

**ACKNOWLEDGEMENT OF PRINCIPAL**

STATE OF NEW YORK  
COUNTY OF Erie

On the 20th of December in the year 2016, before me personally came Scot Hirschman to me known, who, being by me duly sworn, did depose and say that he/she/they reside(s) in Cattaraugus Co. Ny that he/she/they (is) (are) the **President** of H&K Services, Inc the corporation described in and which executed the above instrument; that he/she/they know the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that it was so affixed by authority of the board of directors of said corporation, and that he/she/they signed his/her/their name(s) thereto by like authority.

*Linda L Veith*

Notary Public

LINDA L. VEITH  
Notary Public of New York  
Qualified in Cattaraugus Co.  
Commission Expires: Dec 21, 2018  
No. 01VE6017824

**ACKNOWLEDGEMENT OF SURETY**

STATE OF NEW YORK  
COUNTY OF Erie

On the 20th day of December in the year 2016, before me personally came Jason N Reid all who, being by me duly sworn, did depose and say that he/she/they reside(s) Erie, that he/she/they (is) (are) the **Attorney-in-Fact** duly appointed of Hudson Insurance Company the corporation described in and which executed the above instrument; that he/she/they know the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that it was affixed by authority of the board of directors of said corporation, and that he/she/they signed his/her/their names(s) thereto by like authority.

*Dina M Marinaro*  
Notary Public

DINA M MARINARO  
Notary Public, State of New York  
No. 01MA6285482  
Qualified in Erie County  
Commission Expires 07/08

*2017*



POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That HUDSON INSURANCE COMPANY, a corporation of the State of Delaware, with offices at 100 William Street, New York, New York, 10038, has made, constituted and appointed, and by these presents, does make, constitute and appoint

William J. Quinn, Thomas J. Vanner, Dina M. Marinaro, Jason Reid, and Ralph J. Vanner, Jr.

its true and lawful Attorney(s)-in-Fact, at New York, New York, each of them alone to have full power to act without the other or others, to make, execute and deliver on its behalf, as Surety, bonds and undertakings given for any and all purposes, also to execute and deliver on its behalf as aforesaid renewals, extensions, agreements, waivers, consents or stipulations relating to such bonds or undertakings provided, however, that no single bond or undertaking shall obligate said Company for any portion of the penal sum thereof in excess of the sum of Ten Million Dollars (\$10,000,000.00).

Such bonds and undertakings when duly executed by said Attorney(s)-in-Fact, shall be binding upon said Company as fully and to the same extent as if signed by the President of said Company under its corporate seal attested by its Secretary.

Witness Whereof, HUDSON INSURANCE COMPANY, has caused these presents to be of its Executive Vice President thereunto duly attested, on this 27th day of July, 2012, at New York, New York.



HUDSON INSURANCE COMPANY

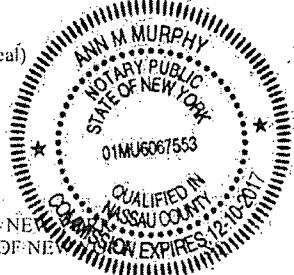
Attest: [Signature] Dina Daskalakis Assistant Corporate Secretary

By: [Signature] Christopher T. Suarez Executive Vice President

STATE OF NEW YORK COUNTY OF NEW YORK SS.

On the 27th day of July, 2012, before me personally came Christopher T. Suarez to me known, who being by me duly sworn did depose and say that he is an Executive Vice President of HUDSON INSURANCE COMPANY, the corporation described herein and which executed the above instrument, that he knows the seal of said Corporation, that the seal affixed to said instrument is such corporate seal, that it was so affixed by order of the Board of Directors of said Corporation, and that he signed his name thereto by like order.

(Notarial Seal)



[Signature] ANN M. MURPHY Notary Public, State of New York No. 01MU6067553 Qualified in Nassau County Commission Expires December 10, 2017

CERTIFICATION

STATE OF NEW YORK COUNTY OF NEW YORK

The undersigned Dina Daskalakis hereby certifies:

That the original resolution, of which the following is a true and correct copy, was duly adopted by unanimous written consent of the Board of Directors of Hudson Insurance Company dated July 27th, 2007, and has not since been revoked, amended or modified:

"RESOLVED, that the President, the Executive Vice Presidents, the Senior Vice Presidents and the Vice Presidents shall have the authority and discretion, to appoint such agent or agents, or attorney or attorneys-in-fact, for the purpose of carrying on this Company's surety business, and to empower such agent or agents, or attorney or attorneys-in-fact, to execute and deliver, under this Company's seal or otherwise, bonds, obligations, and recognizances, whether made by this Company as surety thereon or otherwise, indemnity contracts, contracts and certificates, and any and all other contracts and undertakings made in the course of this Company's surety business, and renewals, extensions, agreements, waivers, consents or stipulations regarding undertakings so made; and

FURTHER RESOLVED, that the signature of any such Officer of the Company and the Company's seal may be affixed by facsimile to any power of attorney or certification given for the execution of any bond, undertaking, recognizance, contract of indemnity or other written obligation in the nature thereof or related thereto, such signature and seal when so used whether heretofore or hereafter, being hereby adopted by the Company as the original signature of such officer and the original seal of the Company, to be valid and binding upon the Company with the same force and effect as though manually affixed."

THAT the above and foregoing is a full, true and correct copy of Power of Attorney issued by said Company, and of the whole of the original and that the said Power of Attorney is still in full force and effect and has not been revoked, and furthermore that the Resolution of the Board of Directors, set forth in the said Power of Attorney is now in force.

Witness the hand of the undersigned and the seal of said Corporation this 20th day of December, 2016



By: [Signature] Dina Daskalakis Assistant Corporate Secretary

**HUDSON INSURANCE COMPANY**  
**SHORT FORM FINANCIAL STATEMENT**  
**AS OF DECEMBER 31, 2015**

**ASSETS**

Bonds	\$	313,923,605
Real estate		0
Cash on hand and on deposit		35,557,494
Reinsurance Receivable		200,109,086
FIT recoverable (including net deferred tax asset)		34,744,519
Aggregate write-ins for other than invested assets		192,627,845
Deferred premiums, agents' balances and installments booked but deferred and not yet due (including earned but unbilled premiums)		35,713,328
Stocks		245,607,541
Other Assets		24,533,005
	\$	1,082,816,423

**LIABILITIES & SURPLUS**

Losses	\$	146,286,447
Loss adjustment expense		18,454,858
Other expenses		28,091,293
Unearned premiums		40,802,657
Ceded reinsurance premiums payable		310,160,451
Payable to parent, subsidiaries and affiliates		13,569,855
Commissions payable, contingent commissions and other similar charges		13,282,826
Other Liabilities		54,299,972
	\$	624,948,359
Preferred and Common capital stock	\$	7,500,238
Gross paid in and contributed surplus		293,480,097
Unassigned funds (surplus)		156,887,729
Surplus as regards policyholders	\$	457,868,064
	\$	1,082,816,423

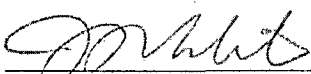
STATE OF NEW YORK )  
) ss:  
COUNTY OF NEW YORK )

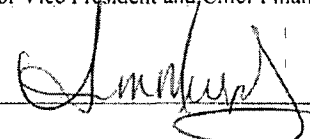
I, the undersigned Senior Vice President and Chief Financial Officer of Hudson Insurance Company hereby certify the foregoing to be a short form financial statement in the form of a balance sheet, showing the Company's assets and liabilities on a provisional basis, at the close of business on December 31, 2015.

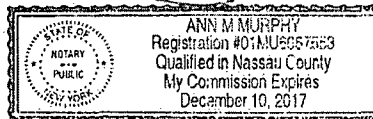
IN TESTIMONY WHEREOF, I have set my hand and affixed the seal of the Company, this 2<sup>nd</sup> day of March, 2016.



Subscribed and sworn to before me this 2<sup>nd</sup> day of March 2016  
My commission expires \_\_\_\_\_

  
\_\_\_\_\_  
John Verbich  
Senior Vice President and Chief Financial Officer

  
\_\_\_\_\_



ERIE COUNTY WATER AUTHORITY  
BUFFALO, NEW YORK

CONTRACT No: OBG-12A  
STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT  
PROJECT No: 201500169

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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## 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

### 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

### 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

### 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 to purchasing and maintaining liability and property insurance are set forth in Article 5.

### 8.06 *Change Orders*

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

### 8.07 *Inspections, Tests, and Approvals*

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

### 8.08 *Limitations on OWNER'S Responsibilities*

A. The OWNER shall not supervise, direct, or have control or authority over, nor be responsible for, CONTRACTOR'S means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any



failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work. OWNER will not be responsible for CONTRACTOR'S failure to perform the Work in accordance with the Contract Documents.

#### 8.09 *Undisclosed Hazardous Environmental Condition*

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

#### 8.10 *Evidence of Financial Arrangements*

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

### ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

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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

### 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 para-

graph 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 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: OBG-12A  
STURGEON POINT AND VAN DE WATER IMPROVEMENTS PROJECT  
PROJECT NO: 201500169

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-4.02 Add new paragraphs immediately after paragraph 4.02.B which are to read as follows:

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

The following records of explorations at the Site:

- a. Limited Hazardous Materials Survey, Sturgeon Point Water Treatment Plant – Atlantic Testing Laboratories, Limited – December 22, 2015

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. Sturgeon Point Project – As Built – Buck, Seifert and Jost – April 1958
- b. Sturgeon Point Project Additions – Malcolm Pirnie – November 1966
- c. Contracts Nos. 16A and 16B - Sturgeon Point Filtration Plant Expansion – Malcom Pirnie, Inc – August 1972
- d. Contracts 22A and 22B – Jerome D. Van De Water Treatment Plant – Malcolm Pirnie – January 1974

- e. Contract No. 17 – Sturgeon Point Pretreatment and Dewatering Facilities – Malcolm Pirnie – November 1974
- f. Contract 5R – Water System Improvements – R&D Engineering and Land Surveying, P.C. – July 1987
- g. Sturgeon Point Water Treatment Plant – Malcolm Pirnie – March 1998
- h. Van De Water Treatment Plant Coagulation Basins Upgrades – Malcolm Pirnie – February 2012

Copies of the applicable reports and drawings listed above are included in the supplemental information.

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 did not utilize any report or drawing related to a Hazardous Environmental Condition identified at the Site except as identified in SC-4.02.

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

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

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

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

“SC-5.04 *Insurance Requirements*

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

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

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

SC-6.02.B.2 Maintenance and cleanup activities may be performed during hours other than regular working hours provided that such

activities do not require the startup or operation of construction equipment.

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

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

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

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

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

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

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

"SC-6.10.B OWNER is exempt from payment of sales and compensating use taxes of the State of New York and of cities and counties on all materials to be incorporated into the Work.

1. OWNER will furnish the required certificates of tax exemption to CONTRACTOR for use in the purchase of supplies and materials to be incorporated into the Work.
2. OWNER'S exemption does not apply to construction tools, machinery, equipment, or other property purchased by or

leased by CONTRACTOR, or to supplies or materials not incorporated into the Work.”

SC-6.13.B Add a new paragraph immediately after paragraph 6.10.A, which is to read as follows:

“SC-6.13.C The CONTRACTOR is advised that in accordance with Federal regulations (29 CFR 1910.146) the OWNER has designated the interior of the Coagulation Basins and the Filters as “permit required confined spaces”, which meets OSHA’s definition. The potential hazards therein may include, but are not limited to, oxygen deficiency, engulfment, entrapment, slips, and falls. Control of these hazards may include, but is not limited to: lockout and tag out of isolation equipment (*e.g.* slide gates); gas monitoring equipment; and personal protective equipment.

Entry into a permit required confined space is only allowed through compliance with a permit required confined space program meeting the requirements of 29 CFR 1910.146.

If the OWNER’s employees or agents enter the spaces to perform work at the same time the CONTRACTOR is working there, both parties shall follow a coordinated program approved by both the OWNER and the CONTRACTOR. Coordinated entries do not alleviate the CONTRACTOR from having its own permit required confined space program.

SC-6.15.A. Add a new paragraph immediately after paragraph 6.15.A, which is to read as follows:

“SC-6.15.B CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with all Laws and regulations. CONTRACTOR shall provide a centralized location for the maintenance of the material safety data sheets or other hazard communication information required to be made available by any employer on the Site. Location of the material safety data sheets or other hazard communication information shall be readily accessible to the employees of any employer on the Site.”

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

“SC-7.02 *Separate Contractor Claims*

- A. Should CONTRACTOR cause damage to the work or property of any other contractor at the Site, or should any claim arising out of CONTRACTOR'S performance of the Work be made by any other contractor against CONTRACTOR, OWNER, or ENGINEER, CONTRACTOR shall promptly settle with such other contractor by agreement, or otherwise resolve the dispute by arbitration or at law.
- B. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, and the officer, directors, partners, employees, agents, and other consultants or subcontractors of each and any of them from and against all claims, costs, losses and damages (including but not limited to, all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising directly, indirectly, or consequentially out of or relating to any claim or action, legal or equitable, brought by any other contractor against OWNER, ENGINEER, to the extent based upon CONTRACTOR'S performance of the Work.
- C. Should another contractor cause damage to the Work or property of CONTRACTOR at the Site or should the performance of work by any other contractor give rise to any other claim, CONTRACTOR shall not institute any action, legal or equitable, against OWNER, ENGINEER, or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from OWNER, ENGINEER, on account of any such damage or claim.
- D. If CONTRACTOR is delayed at any time in performing or furnishing Work by any act or neglect of another contractor and OWNER and CONTRACTOR are unable to agree as to the extent of any adjustment in Contract Times attributable thereto, CONTRACTOR may make a claim for an extension of time in accordance with paragraph 10.05. Notwithstanding any other provision of the Contract Documents, an extension of the Contract Times shall be CONTRACTOR'S sole and exclusive remedy with respect to OWNER, ENGINEER, for any delay, disruption, interference or hindrance caused by any other contractor."

SC-9.03

Add a new paragraph immediately after paragraph 9.03.A which is to read as follows:

"SC-9.03.B. Resident Project Representative (RPR) will be OWNER'S agent at the Site, will act as directed by and under the supervision of OWNER, and will confer with OWNER AND ENGINEER regarding RPR's actions. RPR's dealings in matters pertaining to the on-site Work shall in general be with OWNER and CONTRACTOR keeping ENGINEER advised as

necessary. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of CONTRACTOR."

- SC-13.07      Modify paragraphs 13.07.A. and C. by changing the words "one year" in the first line to "two years".
- SC-14.02.A.    Add a new paragraph immediately after paragraph 14.02.A.3. which is to read as follows:
- "4. Each Application for Payment shall be accompanied by a copy of the certified payroll record."
- SC-14.07.A.    Add a new paragraph immediately after paragraph 14.07.A.3. which is to read as follows:
- "4. The Final Application for Payment shall be accompanied by a copy of the certified payroll record."
- SC-14.07.A.2    Modify paragraph 14.07.A.2 by changing the words "subparagraph 5.04.B.7" to "SC-5.04".
- SC-17.06      Add new paragraphs immediately after paragraph 17.06.A. which are to read as follows:

"ARTICLE SC-18 - STATUTORY REQUIREMENTS

SC-18.01    This Article contains portions of certain Laws or Regulations which, by provision of Law or Regulations, are required to be included in the Contract Documents. The material included in this Article may not be complete or current. CONTRACTOR'S obligation to comply with all Laws and Regulations applicable to the Work is set forth in paragraph 6.09 of the General Conditions.

SC-18.02    Non-Discrimination in Employment:

- A. During the performance of this contract, CONTRACTOR agrees as follows:
1. CONTRACTOR will not discriminate against any employee or applicant for employment because of race, creed, color, or national origin, and will take affirmative action to insure that they are afforded equal employment opportunities without discrimination because of race, creed, color or national origin. Such action shall be taken with reference but not limited to: recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff or termination, rates of pay or other forms of compensation, and selection for training or retraining, including apprenticeship and on-the-job training.
  2. CONTRACTOR will send to each labor union or representative of workers with which he has or is bound by a collective bargaining or other agreement or understanding, a notice, to be provided by the State Commission for Human Rights, advising such labor union or representative of the CONTRACTOR'S agreement

under clauses 1. through 8. hereinafter called "non-discrimination clauses". If the CONTRACTOR was directed to do so by the OWNER as part of the Bid or negotiation of this contract, CONTRACTOR shall request labor union or representative to furnish him with a written statement that such labor union or representative will not discriminate because of race, creed, color or national origin and that such labor union or representative either will affirmatively cooperate within the limits of its legal and contractual authority, in the implementation of the policy and provisions of these non-discrimination clauses or that it consents and agrees that recruitment, employment, and the terms and conditions of employment under this contract shall be in accordance with the purposes and provisions of these non-discrimination clauses. If such labor union or representative fails or refuses to comply with such a request, that it furnish such a statement, CONTRACTOR shall promptly notify the State Commission for Human Rights of such failure or refusal.

3. CONTRACTOR will post and keep posted in conspicuous places, available to employees and applicants for employment, notices to be provided by the State Commission for Human Rights setting forth the substance of the provisions of clauses 1. through 2. and such provisions of the State's Laws against discrimination as the State Commission for Human Rights shall determine.
4. CONTRACTOR will state, in all solicitations or advertisements for employees placed by or on behalf of CONTRACTOR, that all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color or national origin.
5. CONTRACTOR will comply with the provisions of the Executive Law, Human Rights Law, Article 15, will furnish all information and reports deemed necessary by the State Commission for Human Rights under these non-discrimination clauses and such sections of the Executive Law, and will permit access to his books, records and accounts by the State Commission for Human Rights, the Attorney General, District Commissioner of Housing and Community Renewal and the Industrial Commission for purposes of investigation to ascertain compliance with these non-discrimination clauses of the Executive Law, Human Rights Law, Article 15.
6. This contract may be forthwith canceled, terminated or suspended, in whole or in part, by the OWNER upon the basis of a finding made by the State Commission for Human Rights that CONTRACTOR has not complied with these non-discrimination clauses, and CONTRACTOR may be declared ineligible for future contracts made by or on behalf of the State or a public authority or agency of the State or housing authority, or an urban renewal agency, or contracts requiring the approval of the Commissioner of Housing and Community Renewal, until he has satisfied the State Commission for Human Rights after conciliation efforts by the Commission have failed to achieve compliance with these non-discrimination clauses and after a verified complaint has been filed with the Commission, notice thereof has been given to CONTRACTOR and an opportunity has been afforded him to be heard publicly before three members of the Commission. Such sanctions may be imposed and remedies invoked independently of or in addition to sanctions and remedies otherwise provided by law.
7. If this contract is canceled or terminated under clause 6., in addition to other rights of the OWNER provided in this contract upon its breach by CONTRACTOR,

CONTRACTOR will hold the OWNER harmless against any additional expenses or costs incurred by the OWNER in completing the Work or in purchasing the services, materials, equipment or supplies contemplated by this contract, and the OWNER may withhold payments from CONTRACTOR in an amount sufficient for this purpose and recourse may be had against the surety on the Performance Bond if necessary.

8. CONTRACTOR will include the provisions of clauses 1. through 2. in every subcontract or purchase order altered only to reflect the proper identity of the parties in such a manner that such provisions will be binding upon each Subcontractor or vendor as to operations to be performed within the State of New York. CONTRACTOR will take such actions in enforcing such provisions of such subcontract or purchase order as the OWNER may direct, including sanctions or remedies for non-compliance. If CONTRACTOR becomes involved in or is threatened with litigation with a Subcontractor or vendor as a result of such direction by the OWNER, the CONTRACTOR shall promptly so notify the Attorney General, requesting him to intervene and to protect the interest of the State of New York.

SC-18.03 Affirmative Action Requirements:

- A. During the performance of this Contract, the CONTRACTOR agrees that it will abide by and will require its subcontractors to abide by the AUTHORITY'S Affirmative Action Requirements and Women and Minority Business Enterprise Policy, as set forth in the attached Appendix A and hereby made a part of these General Conditions.

SC-18.04 Prevailing Rate Schedule:

- A. The labor on this contract shall be performed in accordance with the requirements of Article 8 (Sections 220-223) of the New York State Labor Law. The supplements to be provided and wages to be paid to workers, laborers and mechanics employed on this contract, determined pursuant to Section 220 of the Labor Law, are set forth in Appendix C, Prevailing Rate Schedule, attached to and hereby made a part of these General Conditions.
- B. CONTRACTOR shall note that the wage rates and supplemental benefits shown in the attached schedules are subject to change. The wage rates and supplemental benefits to be paid and provided shall be those prevailing at the time the contract is being performed.

SC-18.05 Payments to Subcontractors:

- A. In accordance with N.Y. State General Municipal Law, Section 106-b, CONTRACTOR shall:
  1. Within fifteen calendar days of the receipt of any payment from the OWNER, the CONTRACTOR shall pay each of his Subcontractors and materialmen the proceeds from the payment representing the value of the work performed and/or materials furnished by the Subcontractor and/or materialman and reflecting the percentage of



the Subcontractor's work completed or the materialman's material supplied in the requisition approved by the OWNER and based upon the actual value of the subcontract or purchase order less an amount necessary to satisfy any claims, liens or judgments against the Subcontractor or materialman which have not been suitably discharged and less any retained amount as hereafter described. The CONTRACTOR shall retain not more than five per centum of each payment to the Subcontractor and/or materialman except that the CONTRACTOR may retain in excess of five per centum but not more than ten per centum of each payment to the Subcontractor provided that prior to entering into a subcontract with the CONTRACTOR, the Subcontractor is unable or unwilling to provide a Performance bond and a Labor and Material bond both in the full amount of the subcontract at the request of the CONTRACTOR. However, the CONTRACTOR shall retain nothing from those payments representing proceeds owed the Subcontractor and/or materialman from OWNER'S payments to the CONTRACTOR for the remaining amounts of the contract balance after the work or portions thereof are substantially complete. Within fifteen calendar days of the receipt of payment from the CONTRACTOR, the Subcontractor and/or materialman shall pay each of his Subcontractors and materialmen in the same manner as the CONTRACTOR has paid the Subcontractor. Nothing provided herein shall create any obligation on the part of the OWNER to pay or to see to the payment of any moneys to any Subcontractor or materialman from any CONTRACTOR nor shall anything provided herein serve to create any relationship in contract or otherwise, implied or expressed, between the Subcontractor or materialman and the OWNER.

END OF SUPPLEMENTARY CONDITIONS

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**SECTION 01 11 00  
SUMMARY OF WORK**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. Section includes:
1. Project Information
  2. Work Covered by Contract Documents
  3. Work by OWNER
  4. Work Under Separate Construction Contracts
  5. Sequence of Construction
  6. Work Restrictions
  7. Salvage of Equipment and Materials
  8. Partial Utilization by OWNER

**1.2 PROJECT INFORMATION**

- A. Project Identification:
1. Sturgeon Point and Van De Water Improvements Project - Project No. 201500169.
- B. Project Locations:
1. Sturgeon Point WTP:
    - a. 722 Sturgeon Point Road, Derby, NY 14047
  2. Van de Water WTP:
    - a. 3750 River Road, Tonawanda, NY 14150
- C. OWNER:
1. Erie County Water Authority, 3030 Union Rd, Buffalo, NY 14227.
- D. ENGINEER:
1. O'Brien & Gere Engineers, Inc., 400 Andrews Street, Suite 710, Rochester, NY 14604.

**1.3 WORK COVERED BY CONTRACT DOCUMENTS**

- A. The Work of the Project is defined by the Contract Documents and generally consists of the following:
1. Sturgeon Point WTP:
    - a. Demolition of a portion of the EPDM baffle walls and installation of concrete bench walls in Flocculation Basin Nos. 1 through 5; installation of 12-inch slide gates in Flocculation Basin Nos. 3, 4 and 5, removal and disposal of sludge in the Coagulation Basin Influent Channel; installation of access hatches and sampling ports in Sedimentation Basin Nos. 1 through 5; repair of the SuperScraper assemblies in Sedimentation Basin Nos. 1 through 5; replacement of the 20-inch drain valve and the 8-inch sludge draw-off isolation valve in Sedimentation Basin Nos. 1 through 5; installation of a new filter aid air compressor system; installation of three new caustic pumps; installation of three potassium permanganate tanks, mixers and

associated piping; replacement of two hydrofluosilicic acid bulk storage tanks and associated piping; coating of the floors and walls of the Fluoride Room; removal of two polyaluminum chloride bulk storage tanks; removal of one caustic soda bulk storage tank; separation of potable water systems from non-potable water systems at the WTP through the installation of RPZs and new piping; miscellaneous site demolition and restoration work; installation of new lighting in the Chemical Control Area; replacement of the heating and ventilation system in the Fluoride Room; miscellaneous structural modifications and repairs; miscellaneous painting; and miscellaneous electrical modifications.

2. Van de Water WTP
  - a. Replacement of one hydrofluosilicic acid bulk storage tank and associated piping; and miscellaneous painting.

#### **1.4 WORK BY OWNER**

- A. OWNER will perform the following construction activities in connection with the Work at the Project site:
  1. Operation of all existing valves, gates, pumps, equipment, and appurtenances that will affect OWNER's operation, unless specified otherwise.
  2. Removal of a coagulation basin (including both the flocculation compartment and sedimentation compartment) from service, including dewatering and removing debris from the basin, upon notification from the CONTRACTOR.

#### **1.5 WORK UNDER SEPARATE CONSTRUCTION CONTRACTS**

- A. General:
  1. Coordinate the Work of this Contract with work performed under separate contracts. Cooperate fully with separate contractors so work on those contracts may be carried out without interfering with or delaying Work under this Contract or other contracts.
- B. Concurrent Work:
  1. OWNER will award separate contracts for the following construction operations at the Project site. Those operations will be conducted simultaneously with the Work under this Contract.
    - a. NC-34 – Sturgeon Point Raw Water Pumping Station Improvements
    - b. Contract OBG-12C – Sturgeon Point Filter Gallery Improvements
  2. The roadway around the Filter Building and Control Building will be used concurrently by multiple contractors for multiple projects. CONTRACTOR shall coordinate the use and / or work within the roadway with other contractors located on-site.
  3. The Filter Building and Control Building will be used concurrently by multiple contractors for multiple projects. CONTRACTOR shall coordinate the use and/or work within the Filter Building and Control Building with other contractors located within the buildings.

#### **1.6 SEQUENCE OF CONSTRUCTION**

- A. Requirements for sequence of construction and coordination with OWNER'S operations, including maintenance of operations during construction activities, tie-ins and shutdowns, are included in Section 01 31 13 entitled "Coordination with Owner's Operations".



**1.7 WORK RESTRICTIONS**

- A. Limits on the CONTRACTOR's use of the Project site are included in Section 01 14 00 entitled, "Work Restrictions."

**1.8 SALVAGE OF EQUIPMENT AND MATERIALS**

- A. Existing equipment and materials removed and not shown or specified to be reused as part of the Work will become the CONTRACTOR's property and shall be removed from the site.
- B. CONTRACTOR shall remove all equipment and materials specified or indicated to be reused or turned over to the OWNER. Store and protect any items specified or indicated to be reused in the Work. Transport any items to be turned over to the OWNER to a location designated by the OWNER. CONTRACTOR shall be responsible for storing and protecting the items until they are transported off the Project site and turned over to the OWNER. Replace in kind any equipment, materials, and components damaged in removal, storage, or handling through carelessness or improper procedures.
- C. Existing equipment and materials that are removed by the CONTRACTOR shall not be reused in the Work, except where specified or indicated.
- D. CONTRACTOR may furnish and install new items, with ENGINEER's approval and at no additional cost to the OWNER, instead of those items specified or indicated to be salvaged and reused. In this case, any removed items will become the CONTRACTOR's property.

**1.9 PARTIAL UTILIZATION BY OWNER**

- A. CONTRACTOR shall complete portions of the Work prior to completion of the Contract. OWNER reserves the right to utilize and to place into operation equipment in completed portions of the Work, prior to completion, provided such utilization does not interfere with completion of the Work. Such placement of equipment and partial utilization shall not constitute acceptance of the total Work.
  - 1. ENGINEER shall prepare a Certificate of Partial Utilization for each specific portion of the Work to be occupied prior to OWNER acceptance of the completed Work.
  - 2. Before partial utilization by the OWNER, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed, including the Equipment Performance Period. During partial utilization by the OWNER, OWNER will operate and maintain the mechanical and electrical systems serving occupied portions of the Work.
  - 3. During partial utilization by the OWNER, OWNER will assume responsibility for maintenance and custodial service for occupied portions of the Work.

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

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

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**END OF SECTION**

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## SECTION 01 13 13 SCHEDULE OF COMPLETION

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### PART 1 - GENERAL

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#### 1.1 DESCRIPTION

##### A. Scope:

1. CONTRACTOR shall perform the Work to achieve the Contract Times and specified completion requirements.
2. This Section describes completion requirements and is not intended to describe all the Work or its constraints, interrelationships, or sequential requirements.
3. Purpose of completion requirements in the Schedule of Completion is to coordinate the Work with all related operations at the OWNER's facility.
4. All major equipment shall remain in service and be fully operational from dates outlined in Section 01 31 13, Coordination with Owner's Operations.
5. Final site restoration improvements, including painting and cleaning are to be completed prior to Final Completion.

#### 1.2 MILESTONES

##### A. Substantial Completion

1. The General Area of Work for Substantial Completion is located at the Sturgeon Point and Van de Water Treatment Plants.
2. Substantial Completion at Sturgeon Point WTP includes:
  - a. Demolition of a portion of the EPDM baffle walls and installation of concrete bench walls in Flocculation Basin Nos. 1 through 5.
  - b. Installation of 12-inch slide gates in Flocculation Basin Nos. 3, 4 and 5.
  - c. Removal and disposal of sludge in the Coagulation Basin Influent Channel.
  - d. Installation of access hatches and sampling ports in Sedimentation Basin Nos. 1 through 5;
  - e. Repair of SuperScraper Assemblies and the replacement of the 20-inch drain valves and 8-inch sludge draw-off isolation valves in Sedimentation Basins No. 1 through 5.
  - f. Installation of a new filter aid air compressor system.
  - g. Installation of three new caustic pumps.
  - h. Installation of three potassium permanganate tanks and mixers. Installation of potassium permanganate pumps, associated piping, educator and grating.
  - i. Replacement of two hydrofluosilicic acid bulk storage tanks and associated piping. Repair and coating of the floors and walls of the Fluoride Room.
  - j. Replacement of the Remote Spill Container for the  $H_2SiF_6$ , alum and NaOH.
  - k. Removal of two polyaluminum chloride bulk storage tanks and one caustic soda bulk storage tank.
  - l. Separation of potable water systems from non-potable water systems at the WTP through the installation of RPZs and new piping.



- m. Installation of new lighting in the Chemical Control Area and Fluoride Room.
- n. Replacement of the heating and ventilation system in the Fluoride Room.
- 3. Substantial Completion at Van de Water WTP includes:
  - a. Replacement of one hydrofluosilicic acid bulk storage tank and associated piping.
- 4. Where required, CONTRACTOR shall also complete restoration associated with the improvements listed above prior to the Substantial Completion date.
- 5. Substantial Completion items at both WTPs include:
  - a. Successfully performing installation and start-up testing for all equipment listed in other Sections.
  - b. Completing additional tasks listed in Section 01 77 00, Closeout Procedures.
- 6. Work should be completed in accordance with the sequence of construction provided in Section 01 31 13, Coordination with Owner's Operations.

**1.3 SCHEDULE OF COMPLETION**

A. The Schedule of Completion shall be:

Table 01 13 13 - A Schedule of Completion		
General Area of Work	Activity Associated with Completion Requirement	Contract Time
Sturgeon Point Water Treatment Plant	Substantial Completion	280 days
Van De Water Treatment Plant	Substantial Completion	280 days

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

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

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**END OF SECTION**





## SECTION 01 14 00 WORK RESTRICTIONS

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### PART 1 - GENERAL

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#### 1.1 SITE RESTRICTIONS

- A. Confine construction activities to the limits of disturbance indicated on the Contract Drawings. Do not disturb portions of the Project site beyond areas in which the Work is indicated.
- B. Keep driveways, loading areas, and entrances serving the Project site clear and available to the OWNER, OWNER's employees, other contractors and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
  - 1. Schedule deliveries to minimize the use of driveways and entrances by construction operations.
  - 2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Use of Existing Access Roads:
  - 1. CONTRACTOR will be allowed to use the OWNER's existing access roads.
  - 2. CONTRACTOR shall indemnify and hold harmless the OWNER from expenses caused by the CONTRACTOR's operations over existing access roads.
  - 3. CONTRACTOR shall clean existing access roads over which the CONTRACTOR's vehicles travel. Cleaning shall be as directed by the ENGINEER.

#### 1.2 MAINTENANCE AND PROTECTION OF TRAFFIC AND ACCESS

- A. Where Work is performed adjacent to a roadway or parking area, provide and maintain barricades, fences, lights, warning signs, danger signals, and other precautionary measures for protecting persons, property, and the Work. Any barricades shall be visible at night.
- B. CONTRACTOR shall post warning signs at all approaches to the Project site and at construction entrances. Only necessary or authorized vehicles, as determined by the ENGINEER, shall be allowed to enter the work area. CONTRACTOR is responsible for maintaining such warning signs and barricades as may be necessary or required for the safety of those employed in the Work or visiting the Project site.
- C. Access shall be maintained through all phases of work. The CONTRACTOR shall not restrict access to any roadway, driveway or access road by construction equipment or the storage of materials. Where direct access to a roadway, driveway or access road is not possible due to necessary construction operations, the CONTRACTOR shall plan an alternate means of access for the OWNER and submit such plans to the ENGINEER for approval before construction operations commence.
- D. CONTRACTOR's responsibility for maintaining barricades, signs and/or cones, as appropriate, shall continue until the Work is accepted in accordance with the General Conditions.

#### 1.3 STORAGE AND TEMPORARY FACILITIES

- A. Storage of products and equipment, and location of temporary facilities shall be confined to the staging area and the limits of disturbance shown on the Contract Drawings.

- B. Materials and equipment stored on-site shall be moved as directed by the ENGINEER if they interfere with operations of the OWNER and others performing work for the OWNER.

**1.4 TEMPORARY PARKING AREAS**

- A. CONTRACTOR'S employee vehicles shall be parked within the Construction Staging Areas or in an alternate location approved by the ENGINEER or OWNER. No parking will be allowed on the work site (*i.e.* outside the Construction Staging Area or designated alternate location) except for loading and unloading.
- B. Construction vehicles and equipment shall not be parked on permanent roads and parking areas. CONTRACTOR shall park construction vehicles and equipment in the designated Construction Staging Areas.

**1.5 WORKING HOURS**

- A. The Project site is located in a residential area. The CONTRACTOR shall adhere to the following working hours that have been established for this project:
  - 1. Monday to Friday, 7:00 a.m. to 6:00 p.m.
- B. The CONTRACTOR shall apply in writing to the ENGINEER if the CONTRACTOR desires approval to perform work during non-working hours.
- C. The CONTRACTOR shall be responsible for coordinating with affected property owners in advance of performing any work outside the established working hours for this project. At a minimum, forty-eight (48) hours advance notice shall be provided.

**1.6 NON-WORKING HOURS CONSTRUCTION NOISE LIMITS**

- A. The maximum allowable sound levels generated by construction activities occurring outside of normal working hours (Monday to Friday, 7:00 a.m. to 6:00 p.m.) shall not exceed the following:
  - 1. 55 decibels (dBA) at a distance of 50 feet from the source.
- B. The CONTRACTOR shall record sound levels generated by construction activities during non-working hours and provide documentation to the ENGINEER on a daily basis. The ENGINEER may direct the CONTRACTOR to temporarily suspend construction activities if the allowable levels are exceeded until such time that the CONTRACTOR has implemented sufficient remedies to the satisfaction of the ENGINEER.

**1.7 EMPLOYEE IDENTIFICATION**

- A. Provide identification tags for the CONTRACTOR's personnel working on the Project sites. Personnel are required to wear identification tags at all times.

**1.8 RESTORATION**

- A. CONTRACTOR shall promptly repair any damage to the premises caused by construction operations. Return areas within the construction limits and parking areas to pre-construction condition unless otherwise required by the Contract Documents. Remove temporary gates, fencing and traffic controls associated with the Project.

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

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

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**END OF SECTION**



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## SECTION 01 21 00 ALLOWANCES

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### PART 1 - GENERAL

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#### 1.1 DESCRIPTION

- A. This Section includes administrative and procedural requirements governing the following types of allowances.
  - 1. Contingency allowances.
  - 2. Cash allowances.
- B. Authorization of Allowances:
  - 1. Work that will be paid under an allowance will be authorized in the OWNER's written instruction to the CONTRACTOR. Do not perform Work under an allowance without written authorization of the OWNER.

#### 1.2 SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Where applicable, submit a work plan for performing the Work under each allowance.
- D. Coordinate and process submittals for allowance items in the same manner as for other portions of the Work.

#### 1.3 COORDINATION

- A. Coordinate allowance items with other portions of the Work.

#### 1.4 CASH ALLOWANCES

- A. Cash allowances are known amounts for supply of materials or services.
- B. The scope of cash allowance items are described in Section 01 22 13, Measurement and Payment.
- C. At Project closeout, credit unused amounts remaining in the cash allowance to the Owner by Change Order.

#### 1.5 CONTINGENCY ALLOWANCES

- A. Contingency allowances are stipulated amounts available as reserve for sole use by the OWNER to cover unanticipated costs.
- B. When authorization of Work under a contingency allowance item is contemplated by the OWNER for a defined scope, submit a proposal to the CONSULTANT. Prepare the proposal in accordance with the General Conditions and Special Conditions, except that payments within the limit of the contingency allowance item shall exclude cost of bond and insurance premiums.
- C. At Project closeout, credit unused amounts remaining in each contingency allowance item to the OWNER by Change Order.

**1.6 ADJUSTMENT OF ALLOWANCES**

- A. Allowance Adjustment: To adjust allowance amounts, prepare a proposal based on the difference between the cost amount and the allowance. Where applicable, include final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, normal product imperfections, and similar margins.
1. Include installation costs only where indicated as part of the allowance.
  2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
  3. OWNER reserves the right to establish the quantity of work-in-place by independent survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents.
1. Do not include the CONTRACTOR's or subcontractor's indirect expense in the Change Order amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
  2. No change to the CONTRACTOR's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

**PART 2 - PRODUCTS (NOT USED)****PART 3 - EXECUTION****3.1 SCHEDULE OF ALLOWANCES**

<b>Contract Bid /Payment Item No.</b>	<b>Allowance Name</b>	<b>Include Contingency Allowance Amount Of</b>
Item 8	Contingency Allowance – Miscellaneous Improvements Allowance	\$250,000
Item 9	Cash Allowance – Security Allowance	\$75,000
Item 11	Cash Allowance – Control System Integration Allowance	\$125,000
Item 12	Cash Allowance – Potassium Permanganate Pump Allowance	\$30,000

**END OF SECTION**

**SECTION 01 22 13  
MEASUREMENT AND PAYMENT**

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**PART 1 - GENERAL**

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**1.1 DESCRIPTION**

- A. Items listed in Article 1.3 of this Section refer to and are the same payment items listed in the Bid Form and constitute all payment items for completing the Work. No direct or separate payment will be made for providing mobilization, miscellaneous temporary or accessory works, plant services, CONTRACTOR's or ENGINEER's field offices, layout surveys, Project signs, sanitary requirements, testing, safety provisions and safety devices, submittals and as-built drawings, water supplies, power and fuel, traffic maintenance, removal of waste, security, coordination with OWNER's operations, and information technology (including hardware, software, and services) during construction. In addition, no direct or separate payment will be made for bonds, insurance, or other requirements of the General Conditions, Supplementary Conditions, Division 01 specifications and other requirements of the Contract Documents. Compensation for all services, items, materials, and equipment shall be included in prices stipulated for lump sum payment items listed in this Section and included in the Contract.
- B. Each lump sum price shall include an amount considered by the CONTRACTOR to be adequate to cover the CONTRACTOR's overhead and profit for each separately identified item.

**1.2 RELATED PROVISIONS**

- A. Payments to CONTRACTOR: Refer to the Agreement and General Conditions.
- B. Changes in Contract Price: Refer to the Agreement and General Conditions.
- C. Schedule of Values: Refer to the Agreement, General Conditions, and Section 01 29 73 entitled, "Schedule of Values."

**1.3 CONTRACT OBG - 12A**

- A. Payment Item 1 - Chemical Systems
  - 1. Measurement and Payment: Lump sum payment for Payment Item 1 will be full compensation for completing the Work associated with the Fluoride System, Potassium Permanganate System, Polyaluminum Chloride System, Caustic system, Remote Spill Container and Filter Aid Air Compressor System at the Sturgeon Point WTP, with the exception of work completed under Payment Item 12. Lump sum payment for payment Item 1 will also be full compensation for completing the Work associated with the Fluoride System at the Van De Water WTP, as shown or indicated under Contract OBG-12A.
- B. Payment Item 2 - NOT USED
- C. Payment Item 3 - Plant Water System
  - 1. Measurement and Payment: Lump sum payment for Payment Item 3 will be full compensation for completing the Work associated with the separation of the potable water and non-potable water system, including but not limited to, work associated with RPZs and the chlorine booster pumps, as shown or indicated under Contract OBG-12A.

D. Payment Item 4 – Hazardous Materials Abatement

1. Measurement and Payment: Lump sum payment for Payment Item 4 will be full compensation for completing the Work associated with hazardous materials abatement, as shown or indicated under Contract OBG-12A.

E. Payment Item 5 – Coagulation Basins

1. Measurement and Payment: Lump sum payment for Payment Item 5 will be full compensation for completing the Work associated with the coagulation basins, with the exception of work completed under Payment Items 6 and 7, as shown or indicated under Contract OBG-12A.
2. Payment Item 5 includes temporary access and staging required for completion of work covered under Payment Items 6 and 7.

F. Payment Item 6 – Sludge Collector Repairs

1. Measurement: Repairs and modifications to the Sludge Collector System in the five (5) coagulation basins (sedimentation compartments), will be measured for payment based on the limits described below:
  - a. Payment Item 6A – Repair Stainless Steel Glide Strips - Quantity of new companion stainless steel glide strips that will be paid under this item will be the computed number of linear feet of material installed and welded to the existing stainless steel glide strips as directed by the ENGINEER.
  - b. Payment Item 6B – UHMW Glide Strips - Quantity of UHMW glide strips that will be paid under this item will be the computed number of linear feet of material replaced as directed by the ENGINEER.
  - c. Payment Item 6C – Replace Stainless Steel Glide Strips - Quantity of replacement stainless steel glide strips that will be paid under this item will be the computed number of linear feet of material replaced as directed by the ENGINEER.
2. Payment: Unit price for Payment Item 6 will be full compensation for providing all repairs and modifications completed as directed by the ENGINEER under Contract OBG-12A.

G. Payment Item 7 –Concrete Repair

1. Measurement: Concrete repairs including horizontal surface repair, vertical surface repair and joint repair will be measured for payment based on the limits described below:
  - a. Payment Item 7A – Surface Repair - Quantity of surface repair that will be paid under this item will be the computed number of square feet of concrete surface repair as directed by the ENGINEER.
  - b. Payment Item 7B – Joint Repair - Quantity of joint repair that will be paid under this item will be the computed number of linear feet of concrete joint repair as directed by the ENGINEER.
  - c. No payment will be made for concrete repairs under other payment items.
2. Payment: Unit price for Payment Item 7 will be full compensation for providing concrete repairs completed as directed by the ENGINEER under Contract OBG-12A.

H. Payment Item 8 – Miscellaneous Improvements Allowance





1. Measurement and Payment: Contingency Allowance - Miscellaneous improvements under Payment Item 8 will be compensation for completing miscellaneous improvements, as directed by the ENGINEER under Contract OBG-12A.
- I. Payment Item 9 - Security Allowance
  1. Measurement and Payment: Cash Allowance - Security under Payment Item 9 will be compensation for providing a watchman during normal working hours when the CONTRACTOR is on-site.
  2. Description: The watchman shall be responsible for providing security at the Project Site and preventing unauthorized entry onto the OWNER'S property. Watchman shall be on-site throughout construction until OWNER'S acceptance and CONTRACTOR'S occupancy precludes the need for a watchman.
- J. Payment Item 10 - NOT USED
- K. Payment Item 11 - Control System Integration Allowance
  1. Measurement and Payment: Cash Allowance - Work under Payment Item 11 will be full compensation for providing Control System Integration (CSI) Services as specified and/or directed by the ENGINEER.
- L. Payment Item 12 - Potassium Permanganate Pump Allowance
  1. Measurement and Payment: Cash Allowance - Work under Payment Item 12 will be full compensation for purchasing and installing two potassium permanganate pumps as directed by the ENGINEER.

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

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

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END OF SECTION



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## SECTION 01 25 00 SUBSTITUTION PROCEDURES

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### PART 1 - GENERAL

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#### 1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for substitutions. Requests for review of a substitution shall contain complete data substantiating compliance of proposed substitution with Contract Documents.

#### 1.2 CONTRACTOR'S OPTIONS

- A. For materials or equipment (hereinafter referred to as 'products') specified only by reference standard, select product meeting that standard, by any manufacturer, fabricator, supplier or distributor (hereinafter referred to as '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 which is compatible with other products already selected or specified.

#### 1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials and equipment from those required by the Contract Documents and those proposed by the CONTRACTOR.
  - 1. Substitutions for Cause: Changes proposed by the CONTRACTOR that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - 2. Substitutions for Convenience: Changes proposed by the CONTRACTOR or OWNER that are not required in order to meet Project requirements but may offer advantage to the CONTRACTOR or OWNER.

#### 1.4 SUBMITTALS

- A. Substitution Requests: Submit an electronic copy of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product, fabrication or installation cannot be provided, if applicable.
    - b. Coordination information, including a list of changes or revisions needed to other

parts of the Work and to construction performed by the OWNER and other contractors that will be necessary to accommodate proposed substitution.

- c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements. Indicate deviations, if any, from the Work specified.
  - d. Product Data, including drawings and descriptions of products, fabrication and/or installation procedures.
  - e. Certificates and qualification data, where applicable or requested by the ENGINEER.
  - f. List of similar installations for completed projects with project names and Owner's addresses and the names and addresses of the engineers involved.
  - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
  - h. Detailed comparison of the CONTRACTOR's construction schedule using proposed substitution and products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from the manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - i. Cost information, including a proposal of change, if any, in the Contract Sum.
  - j. CONTRACTOR's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in the substitution request, is compatible with related materials, and is appropriate for application indicated.
  - k. CONTRACTOR's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of proposed substitution to produce indicated results.
2. If necessary, the ENGINEER will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. The ENGINEER will notify the CONTRACTOR of acceptance or rejection of proposed substitution within 15 days of receipt of request, or within 7 days of receipt of additional information or documentation, whichever is later.
    - a. Forms of Acceptance: Change Order, Construction Change Directive, or ENGINEER's Supplemental Instructions for minor changes in the Work.
    - b. Use product specified in the Work if ENGINEER does not issue a decision regarding use of a proposed substitution within time allocated.

## 1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

## 1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of approved substitutions.



## PART 2 - PRODUCTS

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### 2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change. ENGINEER will consider written requests from the CONTRACTOR for substitution of products or manufacturers and construction methods during a period of 30 days after date of commencement of Contract Time.
1. Conditions: ENGINEER will consider the CONTRACTOR's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, ENGINEER will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Substitution request is fully documented and properly submitted.
    - c. Requested substitution will not adversely affect the CONTRACTOR's construction schedule.
    - d. Requested substitution is compatible with other portions of the Work.
    - e. Requested substitution has been coordinated with other portions of the Work.
    - f. Requested substitution provides specified warranty.
    - g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: ENGINEER will consider requests for substitution if received within 60 days after Notice of Award. Requests received after that time may be considered or rejected at the discretion of the ENGINEER.
1. Conditions: ENGINEER will consider the CONTRACTOR's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, the ENGINEER will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution offers the OWNER a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities the OWNER must assume. OWNER's additional responsibilities may include compensation to the ENGINEER for redesign and evaluation services, increased cost of other construction by the OWNER, and similar considerations.
    - b. Requested substitution does not require extensive revisions to the Contract Documents.
    - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - d. Substitution request is fully documented and properly submitted.
    - e. Requested substitution will not adversely affect the CONTRACTOR's construction schedule.
    - f. Requested substitution is compatible with other portions of the Work
    - g. Requested substitution has been coordinated with other portions of the Work.
    - h. Requested substitution provides specified warranty.

- i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

**PART 3 - EXECUTION - NOT USED**

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**END OF SECTION**



## SECTION 01 29 73 SCHEDULE OF VALUES

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### PART 1 - GENERAL

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#### 1.1 DESCRIPTION

- A. The requirements of this Section are in addition to the requirements of the General Conditions and Special Conditions.
- B. CONTRACTOR shall submit a Schedule of Values to the ENGINEER for approval. The Schedule of Values is a list of line items, corresponding to each aspect of the Work, establishing in detail the value or cost of each major part of the Work.
- C. Upon request from the ENGINEER, provide supporting data or documentation that substantiates the correctness of the Schedule of Values.
- D. The preliminary Schedule of Values shall be submitted to the ENGINEER for initial review. CONTRACTOR shall incorporate the ENGINEER's comments into the Schedule of Values and provide a re-submittal to the ENGINEER. The ENGINEER may require corrections and re-submittal of the Schedule of Values until it is acceptable.
- E. The Schedule of Values shall be used as the basis for preparing each Application for Payment. The Schedule of Values may be used as a basis for negotiating the price of changes in the Work.
- F. The Schedule of Values shall include an itemized list of Work for each payment item listed in the Bid Form.
- G. Unit price payment items with their associated quantity shall be included in the Schedule of Values. When required by the ENGINEER, provide a detailed breakdown of the unit price payment items in the Schedule of Values.
- H. Schedule of Values requirements are listed below. Requirements for the preliminary Schedule of Values and the final Schedule of Values are identical.
  1. Schedule of Values shall include a breakdown of costs for materials and equipment, installation, and other costs used in preparation of the Bid by the CONTRACTOR. Schedule of Values shall include the purchase and delivery cost for materials and equipment for which the CONTRACTOR may apply for payment as stored materials.
  2. At a minimum, include separate amounts for each Specification division listed in the Contract Documents and for each structure, building, and work area. Use Table of Contents in the Contract Documents as basis for Schedule format and identify each item with the number and title listed in the Table of Contents. List sub-items of major products or systems as appropriate or when requested by ENGINEER.
  3. Identify each line item with a number corresponding to the associated Specification division number. List sub-items for major equipment or systems, as appropriate, or when requested by the ENGINEER.
  4. Include a separate line item for each unit price item.
  5. CONTRACTOR shall include a separate line item for mobilization as part of the lump sum payment item. CONTRACTOR shall document the work activities included in the mobilization line items for the ENGINEER.
  6. Include a line item for bonds and insurance in the mobilization payment item. Payment for this line item may be applied for in the first Application for Payment.
  7. 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 01 78 40, Record Documents.

8. CONTRACTOR shall include items for Project Schedule, General Conditions, and other items, as requested by the ENGINEER. These items shall be included in Applications for Payment on a schedule proposed by the CONTRACTOR and approved by the ENGINEER.
9. Each line item shall include a directly proportional amount of the CONTRACTOR's overhead and profit. CONTRACTOR shall not include overhead and profit as a separate line item.
10. The sum of the individual values shown on the Schedule of Values shall equal the total of the associated payment item. The sum of the payment item totals in the Schedule of Values shall equal the Contract Price.

## 1.2 SUBMITTALS

- A. Submit the preliminary Schedule of Values to the ENGINEER for review within ten days of the execution of the Contract.
- B. Submit the Final Schedule of Values to the ENGINEER at least twenty days prior to the first Application for Payment. The first Application for Payment will not be processed without a Final Schedule of Values approved by the ENGINEER.
- C. When required by the ENGINEER, promptly submit an updated Schedule of Values that includes cost breakdowns for changes in the Work, including Change Orders.

## PART 2 - PRODUCTS - NOT USED

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## PART 3 - EXECUTION - NOT USED

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END OF SECTION



## SECTION 01 31 13 COORDINATION WITH OWNER'S OPERATIONS

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### PART 1 - GENERAL

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#### 1.1 DESCRIPTION

- A. Scope:
1. This Section specifies requirements for coordinating with OWNER's operations during the Work, and provides requirements for tie-ins and shutdowns necessary to complete the Work without impacting OWNER's operations other than as allowed herein.
  2. CONTRACTOR shall provide labor, materials, tools, equipment and incidentals shown, specified and required to coordinate with OWNER's operations during the Work.
- B. Coordination:
1. CONTRACTOR shall be responsible for all coordination with OWNER and scheduling the Work.
  2. CONTRACTOR shall coordinate shutdowns, if required, with OWNER and ENGINEER. When possible, combine multiple tie-ins into a single shutdown to minimize impacts on OWNER's operations and treatment processes.
  3. CONTRACTOR shall review the installation requirements under other sections and be responsible for coordinating the Work in other Specification sections with the Work specified herein.
- C. Related Sections:
1. Section 01 11 00, Summary of Work
  2. Section 01 14 00, Work Restrictions
- D. The Work will take place at the Sturgeon Point Water Treatment Plant (WTP) and the Van de Water Treatment Plant. CONTRACTOR is advised that the OWNER must have complete access to, and use of, all existing facilities, equipment and locations at the WTPs included in OBG 12A and listed below:
1. Sturgeon Point WTP:
    - a. Control Building, including the Chemical Control Area
    - b. Coagulation Basins, including both the sedimentation and flocculation compartments
    - c. Delivered Water Pumping Station
    - d. Wastewater Pumping Station
    - e. Wastewater Treatment Plant
  2. Van de Water WTP:
    - a. Fluoride Room
  3. CONTRACTOR shall provide temporary access, as requested by the OWNER or ENGINEER.
- E. Except for the shutdowns specified herein, the Work shall be performed such that the OWNER's facility remains in continuous, satisfactory operation during the Project. The Work shall be scheduled and conducted by the CONTRACTOR such that it does not impede OWNER's treatment processes, create potential hazards to operating equipment and personnel, reduce the service capacity, reduce the quality of the delivered water, or cause



- other nuisances.
- F. Work not specifically covered herein and in the referenced sections may, in general, be completed at any time during normal work hours, subject to the operating requirements described herein.
  - G. CONTRACTOR has the option of providing additional temporary facilities or performing temporary modifications to OWNER's facilities that can eliminate or mitigate a constraint. Any temporary facilities or modifications shall be completed without additional cost to OWNER and shall not present hazards to personnel, structures, and equipment, adversely affect OWNER's ability to comply with permits and operating requirements, result in reduction in service capacity or generate other nuisances. Any additional temporary facilities or modifications shall be approved by OWNER and ENGINEER prior to implementation.
  - H. CONTRACTOR shall be responsible for any damages and claims resulting from temporary modifications to OWNER's facilities. In the event that CONTRACTOR's temporary modifications to OWNER's facilities result in reduction in service capacity, inability to comply with permits and operating requirements or generation of a nuisance situation, CONTRACTOR shall clean and repair OWNER's facilities as directed by ENGINEER and to the satisfaction of OWNER and ENGINEER.
  - I. CONTRACTOR shall cooperate fully with OWNER when the plant's operations are threatened either due to CONTRACTOR's operations or unforeseen conditions beyond OWNER's control that negatively impact the treatment process and therefore may affect CONTRACTOR's operation. CONTRACTOR shall cooperate fully with OWNER including stopping of Work to avoid detrimental impacts to the treatment process or delivered water quality at no additional cost to OWNER.

## 1.2 SUBMITTALS

- A. Shutdown Submittals
  - 1. Shutdown Planning Submittal: For each shutdown, CONTRACTOR shall prepare an inventory of labor and materials required to perform the shutdown and tie-in tasks, an estimate of the time required for the shutdown including time for OWNER to take down and start up existing equipment, systems, or conduits, and a written description of steps required to complete the Work associated with the shutdown within the constraints outlined in these Contract Documents. Submit the inventory, time estimate, written procedures, and proposed date(s) of the shutdown to the ENGINEER for review at least (15) calendar days prior to the proposed shutdown start date. Do not start a shutdown until ENGINEER approves the shutdown submittal.
  - 2. Shutdown Notification: After approval of a shutdown planning submittal and prior to the shutdown, provide written notification to OWNER and ENGINEER of the date and time at which CONTRACTOR will be ready to perform the Work associated with each shutdown. Provide OWNER and ENGINEER with notification at least five (5) calendar days in advance of each shutdown. OWNER and ENGINEER will confirm with CONTRACTOR that they are prepared to conduct the shutdown and the anticipated date of the shutdown. Shutdown notification form is attached.

## 1.3 GENERAL CONSTRAINTS

- A. Specified below is the sequence of Work and shutdown durations, where applicable, for OWNER's equipment and systems that are to be taken out of service temporarily for the Work. New systems may be used by the OWNER after the specified testing is completed and the units are accepted under Partial Utilization by the ENGINEER in writing.



- B. The operation of existing valves, gates and equipment not indicated for removal under this Project shall be performed by the OWNER. No valve, gate or other equipment shall be operated without knowledge of the OWNER. CONTRACTOR shall give five (5) days prior written notice to the OWNER to coordinate and schedule such operation.
- C. OWNER does not guarantee the operation or water tightness of any valves, gates, or other equipment. CONTRACTOR shall provide all pumping equipment, materials, *etc.*, as required to control all water, as necessary, for the performance of the Work in a dry condition at no additional cost to OWNER.
- D. All operations of existing electrical switches, breakers, disconnects, and other electrical equipment shall be done by OWNER, unless otherwise directed by OWNER and ENGINEER. No shutdowns of electrical service shall occur without OWNER's knowledge. CONTRACTOR shall give five (5) days prior written notice to OWNER to coordinate and schedule such operation.
- E. All operations of existing process equipment shall be done by OWNER, unless otherwise directed by OWNER and ENGINEER. No shutdowns of existing process equipment shall occur without OWNER's knowledge. CONTRACTOR shall give five (5) days prior written notice to OWNER to coordinate and schedule such operation.
- F. All operations of new equipment and new valves shall be done by the OWNER once they are under Partial Utilization, unless otherwise directed by the OWNER and ENGINEER. No shutdowns of equipment shall occur without OWNER's knowledge.
- G. CONTRACTOR shall schedule and perform start-ups, shutdowns and tie-ins on Monday through Thursday. Equipment and systems shall not be placed into operation on Friday, Saturday, Sunday, and OWNER holidays without prior approval of OWNER.
- H. OWNER will dewater and flush out large debris from Coagulation Basin Nos. 1 through 5. Cleaning will also include removal of debris to a reasonable level within the sludge collection trough and drain pit. CONTRACTOR shall allow 5 work days for OWNER to complete these activities for each basin. CONTRACTOR is responsible for any additional work required to dewater and clean the basin to support work activities.

#### 1.4 SEQUENCE OF WORK

- A. The information presented in this section is intended to advise the CONTRACTOR of the general constraints associated with the scheduling and completion of the Work. It is not intended to dictate the CONTRACTOR's means or methods for completion of the Work. CONTRACTOR may submit an alternate sequence of work to the ENGINEER for review; however, CONTRACTOR shall be aware of the constraints stated in this section, and shall not proceed with an alternate sequence of work without receiving written approval from the ENGINEER. OWNER's operations shall not be adversely affected by the proposed alternate sequence of work.
- B. The Work shall generally be constructed without disruption to the OWNER's normal operations, except as noted in this Section and as otherwise approved by the OWNER.
- C. It is hereby understood that Time is of the Essence in performing all Work.
- D. CONTRACTOR shall complete the Work so as to meet the Project Completion date established in the Contract Documents.
- E. The following descriptions of work activities are general and do not list all of the specific activities that are required by the CONTRACTOR to complete the Work. CONTRACTOR shall construct the Work in the following sequence:
  1. Coordination with OWNER and ENGINEER.
  2. Submit shop drawings and other Project documentation (*e.g.*, project schedule, schedule



of values, etc.).

3. Set up the construction staging area(s) and temporary facilities including the CONTRACTOR's field office and temporary sanitary and dumpster facilities.
4. Submit a "Shutdown Planning" submittal for each type of shutdown.
5. Provide OWNER with a Shutdown Notification Form. Shutdowns shall be performed in accordance with CONTRACTOR's approved "Shutdown Planning" submittal and in coordination with OWNER. Refer to Section 1.3, Paragraph H of this specification for information on OWNER's dewatering activities.
6. Work associated with the coagulation basins, chemical systems, system and plant water system can be completed concurrently.
7. Coagulation Basins
  - a. Work within the coagulation basins can only occur between April 1<sup>st</sup> and October 31<sup>st</sup>. Only one coagulation basin can be taken out of service at any one time.
  - b. Each coagulation basin, composed of the sedimentation compartment and flocculation compartment, can be taken out of service for a maximum duration of 40 calendar days. All work within the sedimentation compartment and flocculation compartment must be completed during this time frame.
  - c. Flocculation Compartment
    - 1) Remove the bottom portion of each existing flexible baffle.
    - 2) Install a concrete benchwall under each flexible baffle.
    - 3) Secure the bottom of each flexible baffle to the concrete benchwall with the continuous stainless steel batten strip and stainless steel fasteners.
    - 4) Install 12-inch slide gates in Coagulation Basins 3, 4 & 5.
  - d. Sedimentation Compartment
    - 1) Condition of the sedimentation compartments vary. Repairs and modifications to the Sludge Collector System shall be completed as directed by the ENGINEER. Concrete repairs shall be completed as directed by the ENGINEER.
    - 2) Replace the 8-inch sludge draw-off isolation valve.
    - 3) 20-inch drain valve.
      - a) Prior to initiating work, close the 20-inch drain valves in all five (5) coagulation basins. The drain valves may be closed for a maximum of 8 hours.
      - b) Replace the 20-inch drain valve in one of the coagulation basins.
      - c) Open the 20-inch drain valves in any coagulation basins currently in service.
    - 4) For Coagulation Basins 1 through 5, install sludge sampling ports.
    - 5) For Coagulation Basins 4 & 5, install the access hatch.
  - e. Startup and test the coagulation basin.
  - f. Perform demonstration testing of sludge monitoring equipment.
  - g. Complete the Equipment Performance Period for the coagulation basin.
  - h. Obtain Certificate of Partial Utilization. OWNER will assume responsibility for the coagulation basin.

i. Repeat steps a through h for each of the coagulation basins.

8. Chemical Systems

a. Potassium Permanganate System

- 1) From May 1<sup>st</sup> to July 1<sup>st</sup>, the potassium permanganate system may be out of service. If a longer duration is required, the Contractor is responsible for providing a temporary potassium permanganate system that consists of a minimum 700 -gallon tank, tank mixer and temporary piping to tie into the existing metering pumps and vent piping. The Contractor shall provide a containment skid for the temporary system. Existing equipment scheduled for demolition can be utilized for temporary service.
- 2) Complete demolition activities associated with the existing polyaluminum chloride bulk storage tank and the concrete pads within the Chemical Control Area.
- 3) Remove the two existing potassium permanganate tanks and associated mixers. Remove the existing educator and the existing potassium permanganate pumps. Remove the piping associated with the potassium permanganate system within the limits shown on Contract Drawing M-301.
- 4) Install three potassium permanganate tanks with top mounted mixers. Install two new potassium permanganate pumps.
- 5) Install new piping associated with the potassium permanganate system, as shown on Contract Drawing M-302. Install new educator on the potassium permanganate fill piping.
- 6) Tie-in the new piping to the existing piping, as necessary.
- 7) Install concrete curbing and new platform surrounding the tanks.
- 8) Install new lighting within the Chemical Control Area.
- 9) Install instrumentation equipment and electrical and control wiring and conduit.
- 10) Start-up and test the potassium permanganate system.
- 11) Complete the Equipment Performance Period for the potassium permanganate system.
- 12) Obtain Certificate of Partial Utilization. OWNER will assume responsibility for the potassium permanganate system.

b. Hydrofluosilicic Acid (Fluoride) System (Sturgeon Point WTP)

- 1) The hydrofluosilic acid (fluoride) system may be out of service for a maximum of 30 days. This duration may be extended with prior approval from the Erie County Department of Health.
- 2) Remove the two existing fluoride tanks. Remove the piping associated with the fluoride system within the limits shown on Contract Drawing M-301. Remove the fill piping from the Chemical Control Area to the Chemical Unloading Area.
- 3) Temporarily relocate the existing day tank, transfer pumps, metering pumps and calibration column from the Fluoride Room to the Chemical Control Area.
- 4) Repair the concrete surfaces within the Fluoride Room. Complete the surface preparation and coating of the concrete surfaces within the Fluoride Room.



- 5) Construct in place two FRP bulk storage tanks for the fluoride system.
- 6) Install new piping associated with the fluoride system, as shown on Contract Drawing M-302. Tie-in the new piping to the existing piping, as necessary.
- 7) Install the existing day tank, transfer pumps, metering pumps and calibration column in the Fluoride Room and complete any connections to the new bulk storage tanks and the new and existing piping.
- 8) Install the fill piping from the Chemical Control Area to the Chemical Unloading Area.
- 9) Replace the remote fill container. Coordinate with the OWNER to replace the remote fill container between chemical deliveries for  $\text{H}_2\text{SiF}_6$ , alum and NaOH.
- 10) Replace the heating and ventilating system within the Fluoride Room.
- 11) Install the new lighting within the Fluoride Room.
- 12) Start-up and test the Fluoride System.
- 13) Complete the Equipment Performance Period for the Fluoride System.
- 14) Obtain Certificate of Partial Utilization. OWNER will assume responsibility for the fluoride system.

c. Hydrofluosilicic Acid (Fluoride) System (Van de Water WTP)

- 1) The Hydrofluosilic Acid (Fluoride) System may be out of service for a maximum of 30 days. This duration may be extended with prior approval from the Erie County Department of Health.
- 2) Remove the existing fluoride tank. Remove the piping associated with the Fluoride System within the limits shown on Contract Drawing M-301.
- 3) Construct in place one FRP bulk storage tank for the Fluoride System.
- 4) Install new piping associated with the Fluoride System, as shown on Contract Drawing M-302. Tie-in the new piping to the existing piping, as necessary.
- 5) Reconnect existing instrumentation.
- 6) Start-up and test the Fluoride System.
- 7) Complete the Equipment Performance Period for the Fluoride System.
- 8) Obtain Certificate of Partial Utilization. OWNER will assume responsibility for the Fluoride System.

9. Plant Water System

a. Delivered Water Pumping Station

- 1) From June 19<sup>th</sup> to September 4<sup>th</sup>, the existing 48" discharge header may be taken out of service for a maximum of four hours. During this time, tie into the existing surge relief piping and install a 3" ball valve. Return the 48" discharge header to service.
- 2) Install plant water piping, potable water piping, RPZs as shown on the Contract Drawings.
- 3) Isolate and tie into existing chlorine pump suction piping. Chlorine Booster Pump System may be out of service for a maximum of 2 hours.
- 4) Start-up and test the plant water and potable water systems.



- b. Wastewater Pumping Station
    - 1) Install the RPZs and associated piping as shown on the Contract Drawings.
    - 2) Start-up and test the plant water and potable water systems.
  - c. Wastewater Treatment Plant
    - 1) Replace the RPZs and associated piping as shown on the Contract Drawings.
    - 2) Start-up and test the plant water and potable water systems.
  - d. Control / Filter Building
    - 1) The following piping can be taken out of service for a maximum of 6 hours at any one time. Timing of the shutdown shall be coordinated with the OWNER:
      - a) 12" CW to Washwater Tank
      - b) 10" CW to Surface Wash Header
      - c) 1-1/2" Make-up Water Piping to Polymer Water System
      - d) 1-1/2" Make-up Water Piping to Potassium Permanganate System
      - e) 1-1/2" Make-up Water Piping to Heating Boiler Piping
    - 2) Replace the RPZs and associated piping as shown on the Contract Drawings.
    - 3) Start-up and test the plant water and potable water systems.
10. Miscellaneous Improvements
- a. The following improvements can be incorporated at any time.
    - 1) Remove existing caustic soda bulk storage tank in its entirety and all abandoned or obsolete piping and valves associated with this tank.
    - 2) Installation of the filter aid air compressor system
    - 3) Installation of three new caustic pumps. The caustic system may be taken out of service for a maximum of 6 hours at any one time. Coordinate shutdown with the OWNER and ENGINEER.
    - 4) Removal and disposal of sludge in the Coagulation Basin Influent Channel.
11. Field painting, as indicated in the Contract Documents.
12. Perform any outstanding testing, startup, adjusting and training for systems installed.
13. Site restoration as shown on the Contract Drawings.
14. Submit closeout documentation, including Red Line Drawings, to ENGINEER.

## 1.5 TIE-INS

- A. Table 01 31 13-A lists the connections to existing facilities to be performed by the CONTRACTOR. 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 01 31 13-A, obtain requirements for tie-ins from the ENGINEER.

## 1.6 SHUTDOWNS

- A. General:
  - 1. A shutdown is defined as when a portion of the normal operation of the OWNER's



facility, whether equipment, systems, or conduit, has to be temporarily suspended or taken out of service to perform the Work.

2. Work that may interrupt normal operations shall be completed at times convenient to the OWNER.
3. 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 OWNER's operations.
4. Provide at the Site and in close proximity to the shutdown and tie-in work any tools, equipment, spare parts and materials, both temporary and permanent, necessary to successfully complete the shutdown. Prefabrication of piping and other assemblies shall be completed to the degree possible prior to their associated shutdown. Demonstrate to ENGINEER's satisfaction that CONTRACTOR has complied with these requirements before starting a shutdown.
5. If CONTRACTOR's operations cause an unscheduled interruption of OWNER's operations, CONTRACTOR shall immediately re-establish satisfactory operation for the OWNER.
6. Unscheduled shutdowns or interruptions of OWNER's operations that result in fines or penalties by authorities having jurisdiction shall be the responsibility of CONTRACTOR if, in ENGINEER's opinion, CONTRACTOR caused the unscheduled shutdown or interruption.
7. If during the shutdown period, OWNER has to put the existing facilities back into service due to an unforeseen emergency situation, CONTRACTOR may be ordered to work non-standard working hours until the facilities are back in service. CONTRACTOR shall cooperate fully with the OWNER to immediately place the facilities back in service.
8. Shutdowns shall be per Table 01 31 13-B. Work requiring service interruptions for tie-ins shall be performed during the scheduled shutdowns.
9. Temporary, short-term shutdowns of smaller systems may not be included in Table 01 31 13-B. Coordinate requirements for these shutdowns with the ENGINEER and OWNER.

### 1.7 COORDINATION WITH UTILITIES

- A. CONTRACTOR is cautioned that the location and/or elevations of all existing utilities are not shown on the Contract Drawings.
- B. It is understood and agreed that CONTRACTOR has considered in its bid all of the permanent and temporary utility appurtenances in their present or relocated positions and that no additional compensation will be allowed for any delays, inconveniences, or damage sustained by him due to any interference from the said utility appurtenances or the operation of moving them.
- C. CONTRACTOR shall abide by all rules and regulations governing work adjacent to existing utilities.

## PART 2 - PRODUCTS (NOT USED)

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**PART 3 - EXECUTION**

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**3.1 SCHEDULES**

- A. The schedules listed below are a part of this specification section and are following the “End of Section” designation.
  - 1. Table 01 31 13-A, Schedule of Tie-ins
  - 2. Table 01 31 13-B, Schedule of Shutdowns



**TABLE 01 31 13-A  
SCHEDULE OF TIE-INS**

Tie-In No.	New Facilities and Service	Existing (Connecting) Facilities & Service	Tie-In Building/Location	Associated Milestone	Remarks
1	20" BFV	20" DI Drain Pipe & 36" RCP Basin Drain	Coagulation Basins – Typical x 5	N/A	Complete between April 1 <sup>st</sup> and October 31 <sup>st</sup>
2	Potassium Permanganate System	Potassium Permanganate Fill & Feed Piping	Control Building – Chemical Control Area	N/A	Complete between May 1 <sup>st</sup> and July 1 <sup>st</sup>
3	Sturgeon Point - Fluoride Transfer Piping	Fluoride Transfer Pumps	Control Building – Fluoride Room	N/A	
4	Van De Water – Fluoride System	Fluoride Fill, Pump Suction and Pressure Relief Piping	Van De Water – Fluoride Room	N/A	
5	Chlorine Booster Pump Potable Water Piping	Surge Relief Piping	Delivered Water Pump Station	N/A	Complete between June 19 <sup>th</sup> to September 4 <sup>th</sup>
6	Chlorine Booster Pump Potable Water Piping	Plant Water Piping	Delivered Water Pumps Station	N/A	
7	Plant/ Potable Interconnections	Multiple	Multiple	N/A	
8	Caustic Pumps	Suction and Discharge Piping	Delivered Water Pumps Station	N/A	

**TABLE 01 31 13-B  
SCHEDULE OF SHUTDOWNS**

Shut-down No.	Tanks Out-of-Service During Shutdown	Process Equipment In Operation During Shutdown	Maximum Duration (Calendar Days)
1	Coagulation Basin No. 1	None	40 days
2	Coagulation Basin No. 2	None	40 days
3	Coagulation Basin No. 3	None	40 days
4	Coagulation Basin No. 4	None	40 days
5	Coagulation Basin No. 5	None	40 days
6	Potassium Permanganate System	None	60 days
7	Fluoride System (Sturgeon Point WTP)	None	30 days
8	Fluoride System (Van De Water WTP)	None	30 days
9	48" Discharge Header	42" Transmission Main	4 hours
10	12" CW to Washwater Tank	All filters to be backwashed immediately prior to shutdown	6 hours
11	10" CW to Surface Wash Header	All filters to be backwashed immediately prior to shutdown	6 hours
12	1-1/2" Make-up Water Piping to Polymer Water System	None	6 hours
13	1-1/2" Make-up Water Piping to Potassium Permanganate System	None	6 hours
14	1-1/2" Make-up Water Piping to Heating Boiler Piping	None	6 hours



15	Caustic Pumps	None	6 hours
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END OF SECTION



Contract No. OBG-12A Sturgeon Point and Van De Water Improvements Project  
Project No. 201500169

SHUTDOWN NOTIFICATION

**This Form Shall be Submitted by CONTRACTOR a Minimum of 5 days  
Prior to Request for Shutdown**

CONTRACTOR to Complete:

Shutdown Requested By: \_\_\_\_\_ Date: \_\_\_\_\_

Duration: from (date & time) \_\_\_\_\_ to (date& time) \_\_\_\_\_

Description of Proposed Work during Shutdown:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CONTRACTOR Emergency Contact:

Name: \_\_\_\_\_  
Phone number \_\_\_\_\_  
Cell phone \_\_\_\_\_  
Email \_\_\_\_\_

Requested By (CONTRACTOR)

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

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

OWNER to Complete:

Current Weather Conditions \_\_\_\_\_

Predicted Weather Conditions \_\_\_\_\_

[ ] Long term weather report attached [ ] Valves lock out tag out (see attached)

Work Required by OWNER for Shutdown

\_\_\_\_\_  
\_\_\_\_\_

OWNER Emergency Contact:

Name \_\_\_\_\_  
Phone number \_\_\_\_\_  
Email \_\_\_\_\_

Authorized By (Project Manager)

\_\_\_\_\_ (Signature)      Date \_\_\_\_\_  
\_\_\_\_\_ (Print name)

Authorized By (Operations Manager)

\_\_\_\_\_ (Signature)      Date \_\_\_\_\_  
\_\_\_\_\_ (Print name)

**01 32 00**  
**CONSTRUCTION PROGRESS DOCUMENTATION**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. CONTRACTOR's construction schedule.
- B. Requirements in this Section are in addition to those specified in the General Conditions.

**1.2 DEFINITIONS**

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- C. Event: The starting or ending point of an activity.
- D. Float: The measure of leeway in starting and completing an activity.
  - 1. Float time is not for the exclusive use or benefit of either the OWNER or CONTRACTOR, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and the Contract completion date.
  - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
  - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

**1.3 SUBMITTALS**

- A. CONTRACTOR's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

**1.4 QUALITY ASSURANCE**

- A. Prescheduling Conference: Review methods and procedures related to the CONTRACTOR's construction schedule, including, but not limited to, the following:
  - 1. Discuss constraints, including interim Milestones and Partial Utilization.
  - 2. Review delivery dates for Owner-furnished products.
  - 3. Review time required for review of submittals and resubmittals.
  - 4. Review requirements for tests and inspections by independent testing and inspecting agencies.



5. Review time required for completion and startup procedures.
6. Review and finalize list of construction activities to be included in schedule.
7. Review submittal requirements and procedures.
8. Review procedures for updating schedule.

## 1.5 COORDINATION

- A. Contract G shall incorporate detailed schedules prepared by other contractors into the overall Progress Schedule, and shall maintain the Progress Schedule throughout duration of Project.
- B. Coordinate preparation and processing of schedules and reports with the performance of construction activities and with the scheduling and reporting of separate contractors.
- C. Coordinate CONTRACTOR's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
  1. Secure time commitments for performing critical elements of the Work from entities involved.
  2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

## PART 2 - PRODUCTS

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### 2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Time Frame: Extend schedule from date established for Notice to Proceed to date of Final Completion.
  1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
  1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by CONSULTANT.
  2. Procurement Activities: Include procurement activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in the schedule. Procurement activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  3. Submittal Review Time: Include review and resubmittal times indicated in the Division 01 Section "Submittal Procedures" in the schedule. Coordinate submittal review times in CONTRACTOR's construction schedule.
  4. Startup and Testing Time: Include appropriate durations for startup and testing.
  5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for administrative procedures necessary for certification of Substantial Completion.
  6. Punch List and Final Completion: Include preparation of punch lists and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected



1. Work under More Than One Contract: Include separate activities for each contract.
2. Work by OWNER: Include a separate activity for each portion of the Work performed by OWNER.
3. OWNER-Furnished Products: Include a separate activity for each product furnished by the OWNER.
4. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to:
  - a. Submittals.
  - b. Purchases.
  - c. Fabrication.
  - d. Sample testing.
  - e. Deliveries.
  - f. Installation.
  - g. Tests and inspections.
  - h. Adjusting.
  - i. Curing.
  - j. Startup, commissioning and placement into final use and operation.
5. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
  - a. Structural completion.
  - b. Completion of mechanical installation.
  - c. Completion of electrical installation.
  - d. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in the schedule.
- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
  1. Unresolved issues.
  2. Unanswered RFIs.
  3. Rejected or unreturned submittals.
  4. Notations on returned submittals.
- F. Recovery Schedule: When periodic updates indicate the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which CONTRACTOR intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and the date by which recovery will be accomplished.
- G. Computer Scheduling Software: Prepare schedules using the current version of a program that has been developed specifically to manage construction schedules.

### PART 3 - EXECUTION

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### 3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. CONTRACTOR's Construction Schedule Updating: At monthly intervals, update the construction schedule to reflect actual construction progress and activities. Issue the construction schedule one week before each regularly scheduled progress meeting.
  - 1. Revise the construction schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated construction schedules concurrently with the meeting minutes of each progress meeting.
  - 2. Include a report with the updated construction schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  - 3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved construction schedule to CONSULTANT, OWNER, separate contractors, and other parties identified by CONTRACTOR with a need-to-know schedule responsibility.
  - 1. Post copies in temporary field offices.
  - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

## SECTION 01 32 33 CONSTRUCTION PHOTOGRAPHS

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### PART 1 - GENERAL

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#### 1.1 DESCRIPTION

- A. CONTRACTOR shall retain a professional photographer to perform the services specified below.
- B. Obtain ENGINEER'S approval of the photographer selected prior to taking first photographs. Submit qualifications and experience record of photographer and representative firm.
- C. Digital photography will be accepted if evidence of quality is provided to ENGINEER.

#### 1.2 PRECONSTRUCTION PHOTOGRAPHS

- A. CONTRACTOR shall be responsible for taking a sufficient number of preconstruction photographs so as to resolve any disputes which may arise regarding the conditions prior to and subsequent to construction.
- B. If a dispute arises where no preconstruction photographs were taken, the disputed area shall be restored to the extent directed by the ENGINEER and to the complete satisfaction of the ENGINEER.
- C. The CONTRACTOR must furnish one set of color prints of the preconstruction photographs to the ENGINEER, and must make others available for review in settling any disputes.
- D. The ENGINEER may, at his option, take additional preconstruction photographs which may be used to settle disputes. The ENGINEER is not be required to make these photographs available to the CONTRACTOR.
- E. Preconstruction photographs taken by the CONTRACTOR will not be considered as part of the required number of construction photographs required in Paragraph 1.3 below.

#### 1.3 PHOTOGRAPHS

- A. Take a minimum of 25 color, glossy finish photographs during the construction period.
- B. Photographs shall be taken approximately twice each month when requested by the ENGINEER.
- C. ENGINEER will approve the views to be taken and select the time at which they will be taken.
- D. A minimum of 5 photographs will be taken each time the photographer is at the site.
- E. For outside construction projects, take photographs in good weather with sufficient ambient light. For inside construction projects, use a flash as necessary in low-light conditions.

#### 1.4 PRINTS

- A. Furnish three prints and negatives of each photograph to the ENGINEER as soon as they are available from the photographer.
- B. Furnish additional photographs or prints requested by ENGINEER at cost.
- C. Provide high quality 5-inch by 7-inch standard weight prints with a glossy finish.



- D. Place the following information on the back of each print:
  - 1. Date photograph was taken
  - 2. Title of Project
  - 3. Description of view shown in photograph
  - 4. Name and address of photographer
  - 5. Photographer's numbered identification of exposure

**1.5 DIGITAL PHOTOS (IF ACCEPTED AS ALTERNATE)**

- A. Furnish three prints of each photograph to the ENGINEER as soon as they are available from the photographer. Also, furnish a compact disk (CD) with each photograph dated and project title identified.
- B. Furnish additional photographs or prints requested by ENGINEER at cost.
- C. Provide high quality 5-inch by 7-inch standard weight prints with a glossy finish.
- D. The following information on the back of each print:
  - 1. Date photograph was taken
  - 2. Title of Project
  - 3. Description of view shown in photograph
  - 4. Name and address of photographer
  - 5. Photographer's numbered identification of exposure

**1.6 VIDEO**

- A. Provide a video tape, in VHS format, of the construction area both prior to and post construction. Each video must be minimum 15 minutes long with verbal narration while walking the project site to depict the existing or new condition of all areas affected by the construction.
- B. Submit one copy of each video to ENGINEER for review.
- C. CONTRACTOR shall be responsible for taking a video, which includes all areas of construction so as to resolve any disputes, which may arise regarding the conditions prior to and subsequent to the construction.
- D. For outside construction projects, take videos in good weather with sufficient ambient light.

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

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

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**END OF SECTION**



## SECTION 01 33 00 SHOP DRAWING PROCEDURES

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### PART 1 - GENERAL

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#### 1.1 DESCRIPTION

- A. This section includes requirements for the submittal schedule and the administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals. CONTRACTOR shall provide submittals in accordance with the General Conditions as modified by the Supplementary Conditions, and this Section.

#### 1.2 SCOPE

- A. Provide submittals well in advance of need for the material or equipment, or procedure (as applicable), in the Work and with ample time required for delivery of material or equipment and to implement procedures following ENGINEER's approval or acceptance of the associated submittal. Work covered by a submittal will not be included in progress payments until approval or acceptance of related submittals has been obtained in accordance with the Contract Documents.
- B. CONTRACTOR is responsible for confirming and correcting dimensions based on site conditions, for information pertaining solely to the fabrication processes and to techniques of construction, and for coordinating the work of all trades. CONTRACTOR's stamp and letter of transmittal shall be the CONTRACTOR's representation that the CONTRACTOR has met his obligations under the Contract Documents relative to that submittal.
- C. Samples:
  - 1. Samples shall conform to the General Conditions as modified by the Supplementary Conditions, this Section, and the Specification Section in which the Sample is specified.
  - 2. Furnish Samples and submittals that are related to the same unit of Work or Specification Section at the same time. ENGINEER will not review submittals without associated Samples, and will not review Samples without associated submittals.
  - 3. Samples shall clearly illustrate functional characteristics of the product, all related parts and attachments, and full range of color, texture, pattern, and material.

#### 1.3 DEFINITIONS

- A. Submittals are classified as any manufacturer information, product data, report, equipment limitations or shop drawing that provides information pertinent to installation and operation of equipment. Each required submittal is designated in the respective Specification Sections.
- B. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.



**1.4 SUBMITTALS (REQUIRED FOR THIS SECTION)**

- A. Provide the following:
1. Schedule of Submittals:
    - a. Submit a schedule of submittals, arranged in chronological order by dates required by the construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the ENGINEER and additional time for handling and reviewing submittals required by those corrections.
    - b. Timing:
      - 1) Initial Schedules of Submittals shall be submitted prior to the required Preconstruction Meeting. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
    - c. Format: Arrange the following information in a tabular format:
      - 1) Scheduled date for first submittal.
      - 2) Specification Section number and title.
      - 3) Name of subcontractor.
      - 4) Description of the Work covered.
      - 5) Scheduled date for ENGINEER's final release or approval.
      - 6) Scheduled dates for purchasing.
      - 7) Scheduled dates for installation.
    - d. Content: Identify in the Schedule of Submittals all submittals required by the Contract Documents. Indicate submittals that are on the Project's critical path. Indicate the following, at a minimum, for each submittal:
      - 1) Date by which submittal will be provided to ENGINEER.
      - 2) Whether submittal will be for a "substitution" or "equal". Procedures for substitutions and "or equals" are specified in the General Conditions and the Division 01 Specifications.
      - 3) Date by which ENGINEER's response is required. At least fifteen (15) business days shall be allowed from ENGINEER's receipt of each submittal. Allow increased time for large or complex submittals.
      - 4) Date by which material or equipment must be at the Site to avoid delaying the Work and to avoid delaying the work of other contractors.

**1.5 SUBMITTAL PROCEDURES**

- A. Submittal Identification and Information: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble the complete submittal package into a single indexed file with links enabling navigation to each item.
  2. Name each file according to the following requirements:
    - a. File name shall use Specification Section number followed by a dash and then a sequential number. Re-submittals shall include a second dash and then a sequential



number followed by the letter "R".

3. Provide means to permanently record the CONTRACTOR's review and approval markings and action taken by the ENGINEER.
  4. Include the following information on an inserted cover sheet:
    - a. Project name and Contract Number.
    - b. Transmittal Number
    - c. Date.
    - d. Name of OWNER.
    - e. Name and address of ENGINEER.
    - f. Name of CONTRACTOR.
    - g. Name of firm or entity that prepared the submittal.
    - h. Name of subcontractor.
    - i. Name of supplier.
    - j. Name of manufacturer.
    - k. Number and title of appropriate Specification Section.
    - l. Drawing number and detail references, as appropriate.
    - m. Location(s) where product is to be installed, as appropriate.
    - n. Related physical samples submitted directly.
    - o. Other necessary identification.
- B. CONTRACTOR's Review and Stamp:
1. Before transmitting submittals to ENGINEER, review submittals to:
    - a. Assure proper coordination of the Work;
    - b. Determine that each submittal is in accordance with CONTRACTOR's desires;
    - c. Verify that submittal contains sufficient information for the ENGINEER to determine compliance with the Contract Documents.
  2. Each submittal provided shall bear CONTRACTOR's stamp of approval and signature, as evidence that submittal has been reviewed by CONTRACTOR and verified as complete and in accordance with the Contract Documents.
  3. Submittals that are incomplete, inadequate, or without CONTRACTOR's stamp and signature will be returned without review. Signatures that appear to be computer-generated will be regarded as unsigned and the associated submittal will be returned without review.
- C. Coordination:
1. Coordinate the preparation and processing of submittals with the performance of construction activities.
  2. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  3. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on the approved schedule of submittals.
  4. Coordinate the transmittal of submittals for related parts of the Work so processing will not be delayed because of the need to review submittals concurrently for coordination.

- a. ENGINEER reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- 5. It is the CONTRACTOR's responsibility to review submittals made by his 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 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.
- D. Processing Time: Time for review shall commence on ENGINEER's receipt of submittal. The failure to transmit submittals in sufficient notice of the Work to permit processing, including re-submittals, shall not serve as authorization for an extension of Contract Time. Allow time for submittal review, including time for re-submittals as follows:
  - 1. Initial Review: Allow fifteen (15) business days for initial review of each submittal. Allow increased time for large or complex submittals. Allow additional time if coordination with subsequent submittals is required. ENGINEER will advise CONTRACTOR when a submittal being processed must be delayed for coordination.
  - 2. Intermediate Review: If an intermediate submittal is necessary, the submittal will be processed in the same manner as the initial submittal.
  - 3. Re-submittal Review: Allow fifteen (15) business days for review of each re-submittal.
- E. Options: Identify options requiring selection by the ENGINEER or OWNER.
- F. Deviations: Identify deviations from the Contract Documents on submittals.
- G. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. ENGINEER will return submittals without review that are received from sources other than the ENGINEER.
  - 1. Transmittal Form: Provide locations on form for the following information:
    - a. Project name and Contract number.
    - b. Name of OWNER.
    - c. Date.
    - d. Destination (To:).
    - e. Source (From:).
    - f. Specification Section number and title.
    - g. Indication of full or partial submittal.
    - h. Drawing number and detail references, as appropriate.
    - i. Remarks.
    - j. Signature of transmitter.
  - 2. On an attached separate sheet, prepared on the CONTRACTOR's letterhead, record relevant information, requests for data, revisions other than those requested by the ENGINEER on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. Re-submittals shall be in the same form as initial submittal.
  - 1. Note date and content of revision in label or title block and clearly indicate extent of revision.
  - 2. Resubmit submittals until they are marked with approval notation from CONSULTANT's





action stamp.

- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, and any others as necessary for performance of construction activities.
- J. Use for Construction: Use only final submittals that are marked with approval notation from ENGINEER's action stamp.

## 1.6 SUBMITTAL REQUIREMENTS

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  1. Submit electronic submittals via email or FTP site as PDF files.
    - a. ENGINEER will return annotated file. Retain one copy of the file as an electronic Project record document file.
  2. In addition to the PDF files submitted to the ENGINEER, copies of submittals shall be sent to the ERIE COUNTY WATER AUTHORITY at the Service Center Address at 3030 Union Road, Buffalo, New York 14227.
  3. Certificates and Certification Submittals: Provide a statement that includes the signature of the entity responsible for preparing the certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    - a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
    - b. Provide an original signature on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  1. Mark each submittal to show which products and options are applicable.
  2. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  3. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  4. Submit Product Data in the following format:



- a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless approved by the ENGINEER.
- 1. Preparation: Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer, if specified.
  - 2. Submit Shop Drawings in the following format:
    - a. PDF electronic file.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture.
- 1. Transmit Samples that contain multiple, related components, such as accessories, together in one submittal package.
  - 2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of applicable Specification Section.
  - 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples not designated as OWNER's property, are the property of CONTRACTOR.
  - 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    - a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. CONSULTANT will return submittal with options selected.
  - 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected.
    - a. Number of Samples:
      - i. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      - ii. If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.



- E. **Product Schedule:** As required in individual Specification Sections, a written summary shall be prepared, indicating the types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product, including a unique identifier for each product indicated in the Contract Documents.
  2. Manufacturer's name, product name and model number if applicable.
  3. Number and name of the room or space in which product will be installed.
  4. Location within room or space, in which product will be installed.
  5. Submit product schedule in PDF format.
- F. **CONTRACTOR's Construction Schedule:** Comply with requirements specified in the Section entitled "Construction Progress Documentation."
- G. **Application for Payment:** Comply with requirements specified in General Conditions.
- H. **Schedule of Values:** Comply with requirements specified in the Section entitled "Schedule of Values".
- I. **Qualification Data:** Prepare written information that demonstrates capabilities and experience of the firm or person. Include lists of completed projects with project names and addresses, contact information of CONSULTANT and OWNER, and other information specified.
- J. **Welding Certificates:** Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.
- K. **Installer Certificates:** Submit written statements on manufacturer's letterhead certifying that the Installer complies with the requirements in the Contract Documents and, where required, is authorized by the manufacturer for this specific Project.
- L. **Manufacturer Certificates:** Submit written statements on manufacturer's letterhead certifying that the manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- M. **Product Certificates:** Submit written statements on manufacturer's letterhead certifying that the product complies with requirements in the Contract Documents.
- N. **Material Certificates:** Submit written statements on manufacturer's letterhead certifying that the material complies with requirements in the Contract Documents.
- O. **Material Test Reports:** Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of the material for compliance with the requirements in the Contract Documents.
- P. **Product Test Reports:** Submit written reports indicating that the current product produced by the manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- Q. **Preconstruction Test Reports:** Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- R. **Compatibility Test Reports:** Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

- S. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- T. Maintenance Data: Comply with requirements specified in Division 01 Section "Operations and Maintenance Data."
- U. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

### 1.7 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of CONTRACTOR by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request to the ENGINEER for additional information.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit a digitally-signed PDF electronic file and three paper copies of the certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to the CONTRACTOR to be designed or certified by a design professional.
  - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

### 1.8 ENGINEER'S ACTION

- A. The ENGINEER's review of shop drawings is for general compliance with the Contract Documents only and is not a complete check of the method of assembly, erection, construction or detailed review of the specifications. Such review shall in no way be construed as permitting any departure whatsoever from the Contract Documents, except where the CONTRACTOR has previously requested and received written approval of the ENGINEER for such departure. When requested by CONTRACTOR, proposed departures from the Contract Documents will be considered by ENGINEER at CONTRACTOR's expense, whether or not accepted. The cost of ENGINEER's conflict review and any revisions made as a result of CONTRACTOR's requested departure shall be at the expense of CONTRACTOR. CONTRACTOR shall reimburse OWNER for the referenced costs and expenses of ENGINEER upon demand.
- B. Review of shop drawings by the ENGINEER will be limited to complete submittals except where review of a partial submittal is specifically requested by the CONTRACTOR and where such review of a partial submittal is necessary for timely completion of the Work of the Contract. Where shop drawings of related items are necessary for review of a particular submittal, the ENGINEER will inform the CONTRACTOR, who will promptly submit such shop drawings of said related items.
- C. ENGINEER will review each submittal, make marks to indicate corrections or modifications required, and return it. ENGINEER will stamp each submittal with an action stamp and indicate the action, as follows:
  - 1. "Reviewed," if no change or rejection is made.



2. "Reviewed with Changes Noted," if minor changes or additions are made but resubmittal is not considered necessary.
  3. "Resubmit," if the changes requested are extensive. In this case, the CONTRACTOR shall resubmit the items after correction, in the same format as in the first submittal.
  4. "Rejected," if it is considered that the data submitted cannot, with reasonable revision, meet the requirements of the Contract Drawings and Specifications.
- D. 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 back-charged 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 the CONTRACTOR requests a substitution for a previously approved item, all of ENGINEER's costs in reviewing and approval of the substitution will be back-charged to CONTRACTOR unless the need for such substitution is beyond the control of CONTRACTOR.
- E. After the use of a partial submittal has received approval from the ENGINEER, partial submittals prepared for a portion of the Work will be reviewed.
- F. Incomplete submittals are not acceptable and will be returned without review.
- G. Any submittals not required by the Contract Documents may not be reviewed and may be discarded.

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

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

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END OF SECTION



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**SECTION 01 45 29**  
**TESTING LABORATORY SERVICES PROVIDED BY CONTRACTOR**

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**PART 1 - GENERAL**

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**1.1 DESCRIPTION**

- A. Contract 1G
  - 1. Contractor shall employ and pay for an independent testing laboratory to perform specified services. Laboratory selected shall be subject to approval by ENGINEER.
- B. Inspection, sampling and testing shall be as specified in the Specifications including but not limited to:
  - 1. Concrete tests, Section 03 30 00, Cast-In-Place Concrete
  - 2. Other tests in the Specifications not specifically assigned to others.

**1.2 QUALIFICATIONS OF LABORATORY**

- A. Conform to applicable requirements of ASTM E 329, Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction. Laboratory shall be authorized to operate in the same state as the Site.
- B. Laboratory shall be certified by New York State for testing potable water. A NYS ELAP number shall be referenced on all test results.
- C. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during most recent tour of inspection; with memorandum of remedies of deficiencies reported during inspection.
- D. Testing Equipment:
  - 1. Calibrated at maximum twelve-month intervals by devices of accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.
  - 2. Submit copy of certificate of calibration, made by accredited calibration agency.

**1.3 LABORATORY DUTIES**

- A. Cooperate with the Engineer and provide qualified personnel promptly on notice.
- B. Perform specified inspections, sampling, and testing of materials and methods of construction; comply with applicable standards; ascertain compliance with requirements of Contract Documents.
- C. Promptly notify the Engineer and Contractor of irregularities or deficiencies in the Work observed during performance of services.
- D. Promptly submit five copies of reports of inspections and tests to the Engineer, including:
  - 1. Date issued
  - 2. Project title, number, and Site.
  - 3. Testing laboratory name and address.
  - 4. Name and signature of inspector.
  - 5. Date of inspection or sampling.
  - 6. Record of temperature and weather.



7. Date of test.
  8. Identification of product and Specification Section.
  9. Location in Project.
  10. Type of inspection or test.
  11. Results of tests and observations regarding compliance with Contract Documents.
- E. Perform additional tests and services as required to assure compliance with the Contract Documents.

**1.4 RESPONSIBILITIES OF CONTRACTOR**

- A. Coordinate sampling and testing activities scheduled to be performed by Testing Laboratory with Owner and Engineer.
- B. Cooperate with laboratory personnel and provide access to Work and materials.
- C. Furnish labor and facilities:
  1. To provide access to Work to be tested.
  2. To obtain and handle samples at Site.
  3. To facilitate inspections and tests.
  4. For laboratory's exclusive use for storage and curing of test samples.
  5. For forms for preparing concrete test beams and cylinders.

**1.5 PRODUCT TEST REPORTS**

- A. Furnish copies of product test reports where required by the specification sections and as requested by Engineer.

**PART 2 - PRODUCTS - NOT USED**

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**PART 3 - EXECUTION - NOT USED**

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**END OF SECTION**





**SECTION 01 51 00**  
**TEMPORARY CONSTRUCTION FACILITIES**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. Section includes requirements for temporary utilities, support facilities, security and protection facilities.
- B. Related Sections:
  - 1. Section 01 31 13, Coordination with OWNER's Operations

**1.2 USE CHARGES**

- A. General: Use charges for temporary services and facilities shall be included in the Contract Price unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, OWNER's personnel, CONSULTANT, testing agencies and other contractors.
- B. Water and Electric Power Service: Use charges are waived. Services are provided by OWNER.

**1.3 SUBMITTALS**

- A. Site Plan: Show temporary facilities, utility hookups, construction staging areas, and parking areas for construction personnel.
- B. Moisture-Protection Plan: Describe procedures and controls for protecting materials and equipment from water absorption and damage, including delivery, handling, and storage provisions for materials and equipment subject to water absorption or water damage. Moisture Protection Plan shall describe procedures and controls for discarding water-damaged materials, mitigating water intrusion into completed Work, and replacing water damaged Work.
  - 1. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- C. Dust-Control Plan: Submit coordination drawing and narrative that indicates the dust-control measures proposed for use, proposed locations, and proposed time frame for their operation.

**1.4 QUALITY ASSURANCE**

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

**PART 2 - PRODUCTS**

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**2.1 MATERIALS**

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top rails, with galvanized barbed-wire top strand.



- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10 mils minimum thickness, with flame-spread rating of 15 or less per ASTM E 84.
- C. Dust Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.

## 2.2 TEMPORARY FACILITIES

- A. CONTRACTOR's Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
  - 1. 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 24 hours before utilizing utility. CONTRACTOR shall carry out all operations to avoid interference with operations of the existing facilities.
  - 2. Sufficient temporary heat and ventilation shall be provided to assure safe working conditions and that no damage will occur to any of the Work.
  - 3. 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.
  - 4. CONTRACTOR shall furnish and maintain a safe drinking water supply readily available to all workers.
- B. Storage and Fabrication Sheds: Sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
  - 1. Store combustible materials apart from storage and fabrication sheds.

## 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment:
  - 1. Contractor may use permanent HVAC system for temporary use during construction. Provide filter with MERV of 8 at each return air grille in the system and remove at end of construction. Clean HVAC system as required in Section 01 77 00, entitled "Closeout Procedures."
- C. Air Filtration Units: HEPA primary and secondary filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Locate temporary facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify temporary facilities as required by the OWNER or progress of the Work.
- B. Provide each temporary facility when needed to avoid delay. Do not remove temporary facilities until they are no longer needed or are replaced by authorized use of completed, permanent facilities.



### 3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with OWNER for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction, and provide NYSDOH-listed backflow preventer.
- C. Sanitary Facilities: Provide temporary toilets for use by construction personnel. Comply with government requirements for type, number, location, operation, and maintenance of fixtures and facilities.
- D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures.
- E. Isolation of Work Areas: Prevent dust, fumes, and odors from entering adjacent areas:
  - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with approved coordination drawings.
    - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
  - 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment.
  - 3. Perform daily construction cleanup and final cleanup using approved vacuum equipment.
- F. Ventilation: Provide temporary ventilation required by construction activities for curing or drying of completed installations. Temporary ventilation shall produce required ambient condition and minimize energy consumption.
- G. Electric Power Service: Contract 2A-E shall provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations by all contractors. Relocate temporary service as required.
- H. Lighting: Contract 2A-E shall provide temporary lighting that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Contract 2A-E shall install and operate temporary lighting that fulfills security and protection requirements.
  - 2. Supplemental plug-in task lighting and special lighting shall be provided by each Contractor for its own activities.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
  - 1. Provide construction for temporary offices, shops, and sheds located within the construction limits or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
  - 2. Maintain support facilities until CONSULTANT schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to OWNER.
- B. Traffic Controls: Comply with the following:
  - 1. Existing site improvements are to remain including curbs, pavement, and utilities

2. Maintain access for fire-fighting equipment and access to fire hydrants.
  3. Requirements for maintenance and protection of traffic and access are included in Section 01 14 00 entitled "Work Restrictions."
- C. Project Signs:
1. Temporary Signs: Provide signs as required to inform public and individuals seeking entrance to Project.
    - a. Provide temporary, directional signs for construction personnel and visitors.
  2. Maintain and touchup signs so they are legible at all times.
  3. Signs should be legible at night.
- D. Waste Disposal Facilities: CONTRACTOR shall provide waste-collection containers in sizes adequate to handle waste from construction operations from all contracts.
- E. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- F. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
1. Comply with work restrictions specified in Section 01 14 00 entitled "Work Restrictions."
- B. Temporary Erosion and Sediment Control: Comply with Section, 01 57 13, "Temporary Erosion and Sediment Control," and requirements indicated on Contract Drawings.
- C. Stormwater Control: Comply with requirements specified on Contract Drawings. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Tree and Plant Protection: Install temporary fencing as located on the Contract Drawings or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- F. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.



- H. Temporary Partitions: Provide floor-to-ceiling dustproof partitions where required to limit dust and dirt migration.

### 3.5 MOISTURE AND MOLD CONTROL

- A. CONTRACTOR's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure to airborne mold spores, protect as follows:
  1. Protect porous materials from water damage.
  2. Protect stored and installed material from flowing or standing water.
  3. Keep porous and organic materials from coming into prolonged contact with concrete.
  4. Remove standing water from decks.
  5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
  1. Do not load or install porous materials or components, or items with high organic content, into partially enclosed building.
  2. Keep interior spaces reasonably clean and protected from water damage.
  3. Periodically collect and remove waste containing cellulose or other organic matter.
  4. Discard or replace water-damaged material.
  5. Do not install material that is wet.
  6. Discard, replace or clean stored or installed material that begins to grow mold.
  7. Perform work in a sequence that allows any wet materials adequate time to dry.

### 3.6 OPERATION, TERMINATION AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
  1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  1. Materials and facilities that constitute temporary facilities are property of CONTRACTOR. OWNER reserves right to take possession of Project identification signs.
  2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development,

remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns and dispose of properly. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by the OWNER.

3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 entitled "Closeout Procedures."

**END OF SECTION**



**SECTION 01 52 30**  
**EMERGENCY TELEPHONE NUMBERS**

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**PART 1 - GENERAL**

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**1.1 EMERGENCY TELEPHONE NUMBERS**

- A. The CONTRACTOR shall, at the CONTRACTOR's expense, furnish to the ENGINEER an emergency phone number list for 24-hour contact during the construction period. Include number for office phones and cell 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, etc.
  - 11. Highway Departments
  - 12. 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 x 11 inch paper.

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

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

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END OF SECTION



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## SECTION 01 57 13 TEMPORARY CONTROLS

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### PART 1 - GENERAL

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#### 1.1 SUMMARY

- A. This section includes work items consisting of temporary control measures as required to control soil erosion and water pollution.
- B. Temporary measures shall include silt fencing, mulches, grasses, or other erosion control devices or methods as required.

#### 1.2 RESPONSIBILITY

- A. CONTRACTOR shall be responsible for the temporary control of soil erosion and water pollution resulting from performance of the Work of this Contract.
- B. The stabilization practices to be implemented shall include all measures identified and required within the Contract Documents. CONTRACTOR shall record the dates when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. All measures shall be implemented within the required regulatory time-frames.
- C. In the event of conflict between these specifications and the regulation of other Federal, State, or local jurisdictions, the more restrictive regulations shall apply.

#### 1.3 AUTHORITY

- A. CONSULTANT has the authority to direct the CONTRACTOR to provide immediate, temporary, or permanent erosion or pollution control measures to minimize damage to property and contamination of watercourses and water impoundments.

#### 1.4 DUST CONTROL

- A. Dust resulting from the CONTRACTOR's activities shall be controlled by the CONTRACTOR to prevent nuisances at the Site and nearby areas. Apply water or use other methods subject to the 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.

#### 1.5 PEST AND RODENT CONTROL

- A. Provide pest and rodent control as necessary to prevent infestation of construction or storage area.
  - 1. Employ methods and use materials which will not adversely affect conditions at the site or on adjoining properties.

#### 1.6 WATER CONTROL

- A. Provide methods to control surface water and water from excavations and structures to prevent damage to the Work, the Site or adjoining properties.
  - 1. Control fill, grading and ditching to direct water away from excavations, pits, tunnels and other construction areas; and to direct drainage to proper runoff courses so as to



prevent any erosion, damage or nuisance.

- B. Provide, operate and maintain equipment and facilities of adequate size to control surface water.

## 1.7 POLLUTION CONTROL

- A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.
- B. Provide equipment and personnel, perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.
  - 1. Excavate and dispose of any contaminated earth offsite and replace with suitable compacted fill and topsoil.
- C. Take special measures to prevent harmful substances from entering public waters.
  - 1. Prevent disposal of wastes, effluents, chemicals or other such substances adjacent to streams, or in sanitary or storm sewers.
- D. Provide systems for control of atmospheric pollutants.
  - 1. Prevent toxic concentrations of chemicals.
  - 2. Prevent harmful dispersal of pollutants into the atmosphere.
- E. All CONTRACTOR's equipment used during construction shall conform to all current federal, state and local laws and regulations.
- F. The CONTRACTOR is responsible to abide by the Storm Water Pollution Prevention Plan (SWPPP) and Notice of Intent (NOI) prepared by the ENGINEER to the New York State Department of Environmental Conservation (NYSDEC) prior to the start of construction of this project. Certifications are to be signed by the CONTRACTOR and all subcontractors. The SWPPP and a copy of the NOI shall be submitted to the Highway Department of jurisdiction along with a Highway Permit Application for approval.

## 1.8 EROSION CONTROL

- A. Plan and execute construction and earthwork by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
  - 1. Hold the areas of bare soil exposed at one time to a minimum.
  - 2. Provide temporary control measures such as berms, dikes and drains.
- B. Construct fills and waste areas by selective placement to eliminate surface silts or clays, which will erode.
- C. Periodically inspect earthwork to detect any evidence of the start of erosion, apply corrective measures as required to control erosion.

## PART 2 - PRODUCTS

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### 2.1 MATERIALS

- A. Silt fencing and associated materials shall be as shown on the Contract Drawings. Filter cloth shall be Filter X, Mirafi 100X, or Stabilika T140N.
- B. Heavy, Medium, and Light Stone Fill, and Crushed Stone shall be as specified in the Contract Documents.

- C. Seed mixture and grasses shall be as specified in the Contract Documents or other species suitable for temporary cover which will not compete with the grasses sown later for permanent cover.:
- D. All erosion and sediment control materials shall be approved by CONSULTANT.

**PART 3 - EXECUTION**

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**3.1 WORK AREAS**

- A. All erosion and sediment control devices and products shall be inspected routinely and in accordance with the NYS Stormwater Management Design Manual. Any required repairs shall be made promptly and completely.
- B. Installation and maintenance of all products shall be in accordance with the manufacturer's recommendations and in conformance with the requirements of the CONSULTANT.

**3.2 RESTORATION**

- A. Remove and restore all temporary drainage devices, ditches, sumps, catch basins and drainage piping, if applicable, when no longer needed. All restoration shall be complete to the satisfaction of the CONSULTANT.

**3.3 INSPECTIONS**

- A. CONTRACTOR shall inspect disturbed areas of the construction site, construction staging areas, temporary, soil stockpile locations and area where vehicles exit the Project site.
- B. Disturbed areas, including construction staging areas and temporary soil stockpile locations, shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving water. Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.
- C. Inspections shall be in accordance with the NYS Stormwater Management Design Manual.

**END OF SECTION**



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**SECTION 01 66 00**  
**PRODUCT STORAGE AND HANDLING REQUIREMENTS**

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**PART 1 - GENERAL**

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**1.1 DESCRIPTION**

- A. This Section includes general requirements for storing, transporting and protecting materials and equipment.
- B. 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.
- C. 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.
- D. If necessary to move stored materials and equipment during construction, CONTRACTOR shall move or cause to be moved materials and equipment without any additional compensation.

**1.2 DELIVERY**

- A. Arrange deliveries of products in accordance with construction schedules and in ample time to facilitate inspection prior to installation.
- B. Coordinate deliveries to avoid conflict with Work and conditions at site and to accommodate the following:
  - 1. Work of other contractors, 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 and labels are legible
  - 4. Products are properly protected and undamaged.

### 1.3 PRODUCT HANDLING

- A. Provide equipment and personnel necessary to handle products by methods to prevent soiling or damage to products or packaging.
- B. Provide additional protection during handling as necessary to prevent scraping, marring or otherwise damaging products or surrounding surfaces.
- C. Handle products by methods to prevent bending or overstressing.
- D. Lift heavy components only at designated lifting points.
- E. Materials and equipment shall at all times be handled in a safe manner and as recommended by manufacturer or supplier so that no damage will occur to them. Do not drop, roll or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.

### 1.4 STORAGE

- A. Store and protect materials and equipment in accordance with manufacturer's recommendations and the Contract Documents.
- B. CONTRACTOR shall make all arrangements and provisions necessary for, and pay all costs for, storing materials and equipment. Excavated materials, construction equipment, and materials and equipment to be incorporated into the Work shall be placed to avoid injuring the Work and existing facilities and property, and so that free access is maintained at all times to all parts of the Work and to public utility installations in vicinity of the Work. Store materials and equipment neatly and compactly in locations that cause minimum inconvenience to the OWNER, other contractors, public travel, and owners, tenants, and occupants of adjoining property. Arrange storage in manner to allow easy access for inspection.
- C. CONTRACTOR shall be consigned with 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 at the Site for storing materials and equipment are shown or indicated in the Contract Documents, or as approved by the ENGINEER.
- E. Store materials and equipment to become the OWNER's property to facilitate their inspection and ensure preservation of quality and fitness of the Work, including proper protection against damage by freezing, moisture, and high temperatures. Store in indoor, climate-controlled storage areas all materials and equipment subject to damage by moisture, humidity, heat, cold, and other elements, unless otherwise acceptable to the OWNER. When placing orders to Suppliers for equipment and controls containing computer chips, electronics, and solid-state devices, the CONTRACTOR shall obtain, coordinate, and comply with specific temperature and humidity limitations on materials and equipment, because temperature inside cabinets and components stored in warm temperatures can approach 200 degrees F.
- F. CONTRACTOR shall be fully responsible for loss or damage (including theft) of stored materials and equipment.
- G. Do not open manufacturer's containers until time of installation, unless recommended by the manufacturer or otherwise specified in the Contract Documents.
- H. Do not store materials or equipment in structures being constructed unless approved by CONSULTANT in writing.
- I. Do not use lawns or other private property for storage without written permission of the owner or other person in possession or control of such premises.

## 1.5 PROTECTION

- A. Equipment to be incorporated into the Work shall be boxed, crated, or otherwise completely enclosed and protected during shipping, handling, and storage.
- B. Store all materials and equipment off the ground (or floor) on raised supports such as skids or pallets.
- C. Protect painted surfaces against impact, abrasion, discoloration, and other damage. Painted equipment surfaces that are damaged or marred shall be repainted in their entirety in accordance with equipment manufacturer and paint manufacturer requirements, to the satisfaction of the CONSULTANT.
- D. Protect electrical equipment, controls, and instrumentation against moisture, water damage, heat, cold, and dust. Space heaters provided in equipment shall be connected and operating at all times until equipment is placed in operation and permanently connected.

## 1.6 UNCOVERED STORAGE

- A. The following types of materials may be stored outdoors without cover and on supports so there is no contact with the ground:
  - 1. Reinforcing steel.
  - 2. Precast concrete materials.
  - 3. Structural steel.
  - 4. Metal stairs.
  - 5. Handrails and railings.
  - 6. Castings.
  - 7. Fiberglass products.
  - 8. Rigid electrical conduit.
  - 9. Piping, except polyvinyl chloride (PVC) or chlorinated PVC (CPVC) pipe.
- B. Store the above materials on wood blocking so there is no contact with the ground.

## 1.7 COVERED STORAGE

- A. The following materials and equipment may be stored outdoors on supports and completely covered with covering impervious to water:
  - 1. Grout and mortar materials
  - 2. Masonry units.
  - 3. Soil materials and granular materials such as aggregate.
  - 4. PVC and CPVC pipe.
- B. Tie down covers with rope, and slope covering to prevent accumulation of water.
- C. Store loose granular materials, with covering impervious to water, in well-drained area or on solid surfaces to prevent mixing with foreign matter.

## 1.8 FULLY PROTECTED STORAGE

- A. Store all material and equipment not named in Articles 1.4 and 1.5 of this Section on

supports in buildings or trailers that have concrete or wooden flooring, roof, and fully closed walls on all sides. Covering with visquine plastic sheeting or similar material in space without floor, roof, and walls is not acceptable. Comply with the following:

1. Provide heated storage for materials and equipment that could be damaged by low temperatures or freezing.
2. Provide air-conditioned storage for materials and equipment that could be damaged by high temperatures.
3. Protect mechanical and electrical equipment from being contaminated by dust, dirt, and moisture.
4. Maintain humidity at levels recommended by manufacturers for electrical and electronic equipment.

### 1.9 MAINTENANCE OF STORAGE

- A. On scheduled basis, periodically inspect stored materials and equipment to ensure that:
  1. Condition and status of storage facilities is adequate to provide required storage conditions.
  2. Required environmental conditions are maintained on a continuing basis
  3. Materials and equipment exposed to elements are not adversely affected.
- B. Mechanical and electrical equipment requiring long-term storage shall have complete manufacturer's instructions for servicing each item, with notice of enclosed instructions shown on exterior of container or package.
  1. Comply with manufacturer's instructions on scheduled basis.
  2. Space heaters that are part of electrical equipment shall be connected and operated continuously until equipment is placed in service and permanently connected.

### 1.10 MICROPROCESSORS, PANELS AND INSTRUMENTATION STORAGE

- A. Store panels, microprocessor-based equipment, electronics, and other devices subject to damage or decreased useful life because of temperatures below 40 degrees F or above 100 degrees F, relative humidity above 90 percent, or exposure to rain or blowing dust in climate-controlled storage space.
- B. Requirements:
  1. Storage shall be inside an enclosed room at the site as designated by OWNER.
  2. The OWNER and CONSULTANT have the right to inspect materials and equipment during normal working hours.
  3. Placed inside each panel or device a desiccant, volatile corrosion inhibitor blocks (VCI), moisture indicator, and maximum-minimum indicating thermometer.
  4. Check panels and equipment at least once per month. Replace desiccant, VCI, and moisture indicator as often as required, or every six months, whichever occurs first.
  5. Certified record of daily maximum and minimum temperature and humidity in storage facility shall be available for inspection by the OWNER and CONSULTANT. Certified record of monthly inspection, noting maximum and minimum temperature for month, condition of desiccant, VCI, and moisture indicator, shall be available for inspection by the OWNER and CONSULTANT.
- C. Costs for storing climate-sensitive materials and equipment shall be paid by CONTRACTOR. Replace panels and devices damaged during storage, or for which storage temperatures or



humidity range has been exceeded, at no additional cost to the OWNER. Delays resulting from such replacement are causes within the CONTRACTOR's control.

- D. Do not ship panels and equipment to the Site until conditions at the Site are suitable for installation, including slabs and floors, walls, roofs, and environmental controls. Failure to have the Site ready for installation shall not relieve the CONTRACTOR from complying with the Contract Documents.

**1.11 RECORDS**

- A. Keep up-to-date account of materials and equipment in storage to facilitate preparation of Applications for Payment, if the Contract Documents provide for payment for materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing.

**PART 2 - PRODUCTS - NOT USED**

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**PART 3 - EXECUTION - NOT USED**

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**END OF SECTION**



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## SECTION 01 71 23 FIELD ENGINEERING

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### PART 1 - GENERAL

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#### 1.1 DESCRIPTION

- A. CONTRACTOR shall provide field engineering services and professional services of the types indicated for the Project, including:
1. Furnishing civil, structural and other professional engineering services specified or required to execute CONTRACTOR's construction methods.
  2. Developing and making all detail surveys and measurements required for construction; including slope stakes, batter boards, and all other working lines, elevations, and cut sheets.
  3. Providing materials required for benchmarks, control points, batter boards, grade stakes, structure and pipeline elevation stakes, and other items.
  4. Keeping a transit or total station; leveling instrument; and related implements such as survey rods and other measurement devices, at the Site at all times, and having a skilled instrument person available when necessary for laying out the Work.
  5. Being solely responsible for all locations, dimensions and levels. No data other than Change Order, Work Change Directive, or Field Order shall justify departure from dimensions and levels required by the Contract Documents.
  6. Rectifying all Work improperly installed because of not maintaining, not protecting, or removing without authorization established reference points, stakes, marks, and monuments.
  7. Providing such facilities and assistance necessary for the CONSULTANT to check lines and grade points placed by the CONTRACTOR. Do not perform excavation or embankment work until all cross-sectioning necessary for determining payment quantities for Unit Price Work have been completed and accepted by the CONSULTANT.

#### 1.2 CONTRACTOR'S FIELD ENGINEER

- A. Employ and retain at the Site a field engineer with experience and capability of performing all field engineering tasks required of the CONTRACTOR, including:
1. Preparing and maintaining daily reports of activity on the Work. Submit reports to the CONSULTANT including the following information, at minimum:
    - a. Number of employees at the Site.
    - b. Number of employees at the Site for each Subcontractor.
    - c. Breakdown of employees by trades.
    - d. Major equipment and materials installed as part of the Work.
    - e. Major construction equipment utilized.
    - f. Location of areas in which construction was performed.
    - g. Materials and equipment received.
    - h. Work performed, including field quality control measures and testing.
    - i. Weather conditions.

- j. Safety.
  - k. Delays encountered, amount of delay incurred, and the reasons for the delay.
  - l. Instructions received from the CONSULTANT or OWNER.
2. Submit one (1) copy of the CONTRACTOR's daily reports at the CONSULTANT's field office by 9:00 a.m. the next working day after the day covered in the associated report. Daily report shall be signed by responsible member of the CONTRACTOR's staff, such as the CONTRACTOR's project manager or superintendent, or foreman designated by the CONTRACTOR as having authority to sign daily reports.
  3. Check all formwork, reinforcing, inserts, structural steel, bolts, sleeves, piping, other materials and equipment for compliance with the Contract Documents.
  4. Maintain field office files and drawings, record documents, and coordinate field engineering services with Subcontractors and Suppliers as appropriate. Prepare layout and coordination drawings for construction operations.
  5. Check and coordinate the Work for conflicts and interferences, and immediately advise the CONSULTANT of all discrepancies of which the CONTRACTOR is aware.
  6. Cooperate as required with the CONSULTANT in observing the Work and performing field inspections.
  7. Review and coordinate the Work with Shop Drawings and the CONTRACTOR's other submittals.

### 1.3 CONTRACTOR'S SURVEYOR

- A. Employ or retain the services, as needed, at the Site of a surveyor with experience and capability of performing surveying and layout tasks required in the Contract Documents and as required for the Work. Surveyor shall be a professional land surveyor registered and licensed in the jurisdiction where the Project is located, or a professional engineer registered and licensed as a professional engineer in the jurisdiction where the Project is located and authorized under Laws and Regulations to practice surveying. Surveyor's tasks include, but are not necessarily limited to, the following:
  1. Providing required surveying equipment, including transit or theodolite, level, stakes, and surveying accessories.
  2. Establishing required lines and grades for constructing all facilities, structures, pipelines, and site improvements.
  3. Preparing and maintaining professional-quality, accurate, well organized, legible notes of all measurements and calculations made while surveying and laying out the Work.
  4. Prior to backfilling operations, survey, locate, and record on a copy of the Contract Documents accurate representation of buried Work and Underground Facilities encountered.
  5. Complying with requirements of the Contract Documents relative to surveying and related work.

### 1.4 SUBMITTALS

- A. Field Engineering:
  1. Submit daily reports as indicated in this Section.
  2. When requested by the CONSULTANT, submit documentation verifying accuracy of field engineering.

- B. Surveying
  - 1. Complete plan for conducting survey work, submitted ten days prior to beginning survey Work.
  - 2. Example of proposed survey field books to be maintained by the CONTRACTOR's surveyor. Example shall have sufficient information and detail, including example calculations and notes, to demonstrate that field books will be organized and maintained in a professional manner, complying with the Contract Documents.
  - 3. Submit original field books within two days after completing survey Work.
  - 4. Submit certified survey in accordance with this Section.
- C. Certificates: When requested by the CONSULTANT, submit certificate signed by professional engineer or professional surveyor, as applicable, certifying that elevations and locations of the Work comply with the Contract Documents. Explain all deviations, if any.
- D. Qualifications Statements:
  - 1. Field Engineer: Name and address. When requested by the CONSULTANT, submit qualifications.
  - 2. Surveyor: Name and address of firm, and resumes of each professional land surveyor and crew chief conducting the survey Work. Submit at least ten days prior to beginning survey Work. During the Project, submit resume for each new registered land surveyor and crew chief employed by or retained by the CONTRACTOR at least ten days prior to starting on the survey Work.

## 1.5 RECORDS

- A. Maintain at the Site a complete and accurate log of control and survey Work as it progresses.
  - 1. Survey data shall be in accordance with recognized professional surveying standards, Laws and Regulations, and prevailing standards of practice in the locality where the Site is located. Original field notes, computations, and other surveying data shall be recorded by the CONTRACTOR's surveyor in CONTRACTOR-furnished hard-bound field books, and shall be signed and sealed by the CONTRACTOR's surveyor. Completeness and accuracy of survey Work, and completeness and accuracy of survey records, including field books, shall be the responsibility of the CONTRACTOR. Failure to organize and maintain survey records in an appropriate manner that allows reasonable and independent verification of calculations, and to allow identification of elevations, dimensions, and grades of the Work, shall be cause for rejecting the survey records, including field books.
  - 2. Illegible notes or data, and erasures on any page of field books, are unacceptable. Do not submit copied notes or data. Corrections by ruling or lining out errors will be unacceptable unless initialed by the surveyor. Violation of these requirements may require re-surveying the data questioned by the CONSULTANT.
- B. Upon completion of foundation walls and major Site improvements, prepare a certified survey, signed and sealed by professional surveyor, showing dimensions, locations, angles and elevations of construction and locations and elevations of Underground Facilities encountered during the Work.

**PART 2 - PRODUCTS - NOT USED**

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**PART 3 - EXECUTION**

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**3.1 SURVEYING****A. Reference Points:**

1. Refer the General Conditions, as may be modified by the Special Conditions, regarding reference points.
2. OWNER's established reference points damaged or destroyed by the CONTRACTOR will be re-established by the OWNER at the CONTRACTOR's expense.
3. From OWNER-established reference points, establish lines, grades, and elevations necessary to control the Work. Obtain measurements required for executing the Work to tolerances specified in the Contract Documents.
4. Establish, place, and replace as required, such additional stakes, markers, and other reference points necessary for control, intermediate checks, and guidance of construction operations.

**B. Construction Surveying: Comply with the following:**

1. Alignment Staking: Provide alignment stakes at 50-foot intervals on tangent, and at 25-foot intervals on curves.
2. Slope Staking: Provide slope staking at 50-foot intervals on tangent, and at 25-foot intervals on curves. Re-stake at every ten-foot difference in elevation.
3. Structure: Stake out structures, including elevations, and check prior to and during construction.
4. Pipelines: Stake out pipelines including elevations, and check prior to and during construction.
5. Road: Stake out roadway elevations at 50-foot intervals on tangent, and at 25-foot intervals on curves.

**C. Accuracy**

1. Establish CONTRACTOR's temporary survey references points for CONTRACTOR's use to at least second-order accuracy (e.g., 1:10000). Construction staking used as a guide for the Work shall be set at least third-order accuracy (e.g., 1:5000). Basis on which such orders are established shall provide the absolute margin for error specified below.
2. Horizontal accuracy of easement staking shall be plus or minus 0.1 feet. Accuracy of other staking shall be plus or minus 0.04 feet horizontally and plus or minus 0.02 feet vertically.
3. Survey calculations shall include an error analysis sufficient to demonstrate required accuracy.

**END OF SECTION**

## SECTION 01 73 19 INSTALLATION

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### PART 1 - GENERAL

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#### 1.1 SUMMARY

- A. This Section describes general requirements for installing equipment. Additional equipment installation requirements are included in Divisions 2 through 46.

#### 1.2 INSTALLATION QUALITY ASSURANCE AND QUALITY CONTROL

- A. Provide appropriate quality assurance for installing equipment, and provide quality control over manufacturers, equipment, services, site conditions, and workmanship to provide Work of a specified quality.
- B. Install equipment in accordance with approved Shop Drawings, the Contract Documents, and manufacturer's installation data. If manufacturer's data conflicts with the Contract Documents, obtain clarification from the ENGINEER before proceeding.
  - 1. Manufacturer's installation data includes manufacturer's written instructions; drawings; illustrative, wiring and schematic diagrams; diagrams identifying external connections, terminal block numbers and internal wiring; and all other information pertaining to installation of equipment that is not furnished with Shop Drawings. Included are all of the manufacturer's printed installation instructions, including those that may be attached to equipment.
- C. CONTRACTOR's installers shall be experienced in the types of Work required.

#### 1.3 SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. When specified, provide competent, qualified representatives of the equipment manufacturer to provide the services specified, including but not limited to, supervising installation, adjusting, and testing of equipment.

### PART 2 - PRODUCTS

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#### 2.1 EQUIPMENT DRIVE GUARDS

- A. Equipment Drive Guards:
  - 1. Unless otherwise shown or specified, provide metal guards conforming to 29 CFR 1910, Subpart O, for equipment driven by open shafts, belts, chains, pulleys, sheaves, or gears. Guards shall enclose the 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 and securely fasten the guards to the frame of the equipment, floor, or wall as required.
  - 4. Fastenings shall permit removal of guards for servicing equipment.



## PART 3 - EXECUTION

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### 3.1 INSTALLATION

#### A. General:

1. Prior to installing the equipment, complete preparation of surfaces on which the equipment is to be installed. Prior to installing the equipment on new concrete, concrete shall achieve sufficient compressive strength to support the equipment.
2. Maintain Work area in a broom-clean condition during installation of equipment.
3. Use proper tools to assemble equipment. Do not deform or mar surface of shafts, nuts, and other parts.
4. Do not support rigging from existing structures without written permission of the ENGINEER. CONTRACTOR is responsible for and shall repair all damage to existing structures resulting from his operations.'
5. During installation, maintain equipment in neutral position and do not exert undue stress on equipment.
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 equipment and do not burn or weld products unless specified in the Contract Documents or allowed by the 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, and other products necessary to properly align, level, and secure apparatus in place. Install equipment plum and level, unless otherwise specified, and demonstrate plumbness and level to the 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 the Work at the Project Site.
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. Record actual alignment and submit to the ENGINEER. Alignment shall be within the tolerances specified in the Contract Documents and as recommended by the equipment manufacturer.
  4. Use laser indicators or dial indicators for checking angular and parallel alignment. Using dial indicators requires that, during rotation of half couplings in a test performance, the dial indicator shall be maintained in same relative position, and the dial indicator readings taken from the same place on the circumference of coupling.
- D. Threaded Connections:
1. 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**



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## SECTION 01 73 29 CUTTING AND PATCHING

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### PART 1 - GENERAL

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#### 1.1 DESCRIPTION

- A. Contractor shall perform cutting, coring, rough patching and finish patching of holes and openings in existing construction.
- B. Provide cutting, coring, fitting and patching, including attendant excavation and backfill, required to complete the Work, and to:
  - 1. Remove and replace defective Work;
  - 2. Remove construction as indicated in the Contract Documents or as required to complete the Work in the Contract Documents;
  - 3. Uncover Work for Engineer's and Owner's inspection and/or observation;
  - 4. Connect to completed Work not performed in proper sequence;
  - 5. Remove or relocate existing utilities and pipes that obstruct the Work in locations where connections must be made;
  - 6. Make connections or alterations to existing or new facilities.
- C. Structural Elements: Do not cut or patch structural elements in a manner that would change the structural element's load-carrying capacity such as load deflection ratio.
- D. Operating Elements: Do not cut or patch operating elements in a manner that would reduce their capacity to perform as intended. Do not cut or patch operating elements or related components in manner that would increase maintenance requirements or decrease operational life or safety.

#### 1.2 SUBMITTALS

- A. Provide the following submittals to the Engineer for review:
  - 1. Cutting and Patching Request:
    - a. Submit written request to the Engineer well in advance of executing any cutting or alteration that affects:
      - 1) Design function or intent of the Project.
      - 2) Work of the Owner or other contractors.
      - 3) Structural value or integrity of an element of the Project.
      - 4) Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
      - 5) Efficiency, operational life, maintenance, or safety of operational elements.
      - 6) Visual qualities of exposed elements.
    - b. The Contractor's written request shall include:
      - 1) Identification of the Project and contract name and number.
      - 2) Description of affected Work of the Contractor and/or work of others.
      - 3) Necessity for cutting.

- 4) Effect on work of Owner or other contractors, or on structural or weatherproof integrity of the Project.
  - 5) Description of proposed Work, including but not limited to, scope of cutting and patching; trades who will be executing the Work; products proposed to be used; extent of refinishing; schedule of operations; alternatives to cutting and patching, if any.
  - 6) Designation of party responsible for cost of cutting and patching, when applicable.
  - 7) Written permission of other contractors whose work will be affected.
2. Should conditions of Work, or schedule, indicate a change of materials or methods, submit written recommendation to the Engineer including:
    - a. Conditions indicating change.
    - b. Recommendations for alternative materials or methods.
    - c. Submittals as required for substitutions.
  3. Submit written notice designating time Work will be uncovered, for inspection and/or observation by the Engineer and Owner. Do not begin cutting or patching operations until accepted by the Engineer.
- B. Conform to submittal requirements in the Specifications for application and installation of materials used for patching.

### 1.3 WARRANTY

- A. Replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials that do not void required or existing warranties.

## PART 2 - PRODUCTS

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### 2.1 GENERAL

- A. Materials:
  1. Use materials in conformance with the Contract Documents.
  2. If not shown or indicated in the Contract Documents, use materials and products that are identical to the existing materials and products affected by cutting and patching Work.
  3. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible. If identical materials are unavailable or cannot be used, use materials whose installed performance will equal or surpass that of existing materials.
  4. Replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, using materials that do not void required or existing warranties.
- B. Compound Applied to Core-Drilled Surfaces and Cut Concrete Surfaces: After core-drilling and before installing the utility or equipment through the penetration, coat exposed concrete and steel with solvent-free, two-component, epoxy protective coating.



## **PART 3 - EXECUTION**

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### **3.1 GENERAL**

- A. Perform cutting and coring in a manner that limits the extent of patching.
- B. For penetrations through concrete and masonry walls, slabs, or arches, core drill holes unless otherwise accepted by the Engineer in writing.

### **3.2 INSPECTION**

- A. Examine surfaces to be cut or patched and conditions under which cutting or patching are to be performed before commencing cutting or patching Work.
- B. Report unsatisfactory or questionable conditions to the Engineer in writing. Do not proceed with the Work until unsatisfactory conditions are corrected

### **3.3 PREPARATION**

- A. Provide temporary support as required to maintain the structural integrity of the Project, to protect adjacent Work from damage during cutting, and to support the Work to be cut.
- B. Protect existing construction from damage during cutting and patching. Provide protection from adverse weather conditions for portions of the Project that will be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Do not cut existing pipe, conduit, ductwork, or other utilities serving facilities scheduled to be removed or relocated until provisions have been made to bypass them.

### **3.4 CORING**

- A. Perform coring with a non-impact rotary tool using diamond core drills. Size holes for pipe, conduit, sleeves, equipment, or mechanical seals, as required.
- B. Protect existing equipment, utilities and adjacent areas from water and other damage during coring operations.
- C. Vacuum or otherwise remove slurry or tailings from the Work area following coring.
- D. Do not core-drill through electrical conduit or other utility lines embedded in walls or floors without approval of the Engineer. To the extent possible, avoid cutting reinforcing steel in floors and walls. After core-drilling, coat the exposed concrete and steel with Sika 62 or equal before installing the utility through the penetration.

### **3.5 CUTTING**

- A. Cut existing construction using methods least likely to damage elements retained or adjoining construction, and that will provide proper surfaces to receive installation or repair.
  - 1. In general, use hand or small power tools designed for sawing or grinding, not hammering and chopping.
  - 2. Cut through concrete and masonry using a concrete wall saw with diamond saw blades.
    - a. Provide for control, on both sides of walls, of slurry generated by sawing.



- B. Cut holes and slots as small as possible, neatly to the size required, and with minimum disturbance of adjacent surfaces. Provide temporary covering over openings that are not in use.
- C. To avoid marring existing finished surfaces, cut or drill from exposed or finished side into concealed side.
- D. Provide adequate bracing of area to be cut prior to commencement of cutting.
- E. Provide equipment of adequate size to remove cut panel.
- F. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
- G. Maintain adequate ventilation when using cutting torches.

### 3.6 PATCHING

- A. Patch construction by filling, repairing, refinishing, closing-up and/or similar operations following performance of other Work.
  - 1. Closely match texture and finish of existing adjacent surface.
  - 2. Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
  - 3. Where patching smooth painted surfaces, extend final paint coat over entire unbroken surface containing the patch after the surface has received primer and second coat.
  - 4. Inspect and test patched areas to demonstrate integrity of the installation, where feasible.
  - 5. Provide materials and comply with installation requirements specified in the Contract Documents.
- B. Work shall be installed airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
- C. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
  - 1. For continuous surfaces, refinish to nearest intersection.
  - 2. For an assembly, refinish entire unit

### 3.7 CLEANING

- A. Clean areas and spaces where cutting, coring and patching are performed. Clean piping, conduit, or similar constructions before applying paint or other finishing materials. Restore damaged pipe covering to original condition.

**END OF SECTION**



## SECTION 01 77 00 CLOSEOUT PROCEDURES

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### PART 1 - GENERAL

---

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final Completion procedures.
  - 3. Lockout Tagout procedures.
  - 4. Warranties.
  - 5. Final cleaning.
- B. Requirements in this Section are in addition to those specified in the General Conditions.

#### 1.2 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following:
  - 1. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 2. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 3. Prepare and submit Project Record Documents including, but not limited to, operation and maintenance manuals, as-built drawings, final completion construction photographic documentation, damage or settlement surveys, and similar final record information.
  - 4. Deliver tools, spare parts, extra materials, and similar items to a location designated by Owner. Label with manufacturer's name and model number where applicable.
  - 5. Deliver keys to Owner and advise Owner's personnel of changeover in security provisions.
  - 6. Complete startup testing of systems.
  - 7. Submit testing, adjusting and balancing records.
  - 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  - 9. Advise Owner of changeover in heat and other utilities.
  - 10. Complete final cleaning requirements, including touchup painting.
  - 11. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
  - 12. Schedule a walk through with the Owner and Engineer. A Certificate of Substantial Completion, including a list of items identified during the walk through to be completed and corrected (punch list) shall be prepared by the Engineer.



### 1.3 LOCKOUT TAGOUT PROCEDURES

- A. CONTRACTOR shall provide written lockout tagout (LOTO) procedures for each new piece of equipment under this Contract.
- B. LOTO procedure shall be in accordance with the OWNER's Lockout and Tagout Procedure Manual. The OWNER's Lockout and Tagout Procedure Manual is attached along with an equipment example.

### 1.4 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining Final Completion, complete the following:
  - 1. Submit a final Application for Payment according to General Conditions and Special Conditions.
  - 2. Submit a certified copy of the Engineer's Substantial Completion inspection list (punch list), endorsed and dated by Engineer. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  - 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  - 4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings, if available.
- B. Final Inspection: Submit a written request for final inspection for acceptance. Upon receipt of request, Engineer will either proceed with the inspection or notify Contractor of unfulfilled requirements. Engineer will prepare a final Certificate for Payment after the final inspection is completed or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
  - 1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

### 1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. List will include name and identification of each space and area affected by construction operations that includes incomplete items and items needing correction. List will include, if necessary, areas disturbed by Contractor that are outside the limits of construction.
  - 1. List of spaces will be organized in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
  - 2. Items applying to each space will be organized by major element, including categories for ceiling, individual walls, floors, equipment, and systems.
  - 3. List will include the estimated value of each item to be completed or corrected.

### 1.6 WARRANTIES

- A. Submittal Time: Submit written warranties upon Engineer's request for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Utilization: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied by Owner under partial utilization.



- C. Organize warranty documents into an orderly sequence based on the table of contents of the Contract Documents.
  - 1. Scan warranties and bonds and assemble into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

## **PART 2 - PRODUCTS**

---

### **2.1 MATERIALS**

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

## **PART 3 - EXECUTION**

---

### **3.1 FINAL CLEANING**

- A. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Employ experienced workers for final cleaning. Comply with manufacturer's written instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of the Project:
    - a. Clean Project site and areas disturbed by construction activities of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, and similar spaces.
    - h. Sweep concrete floors broom clean in unoccupied spaces.
    - i. Clean transparent materials, including glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish glass, taking care not to scratch surfaces.
    - j. Remove labels that are not permanent.

- k. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
  - 1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
- l. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- m. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
- n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- p. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
  - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report upon completion of cleaning.
- q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
- r. Leave Project clean and ready for occupancy.

**END OF SECTION**

# Lockout Procedures

**Objective:** To prevent the unexpected startup or release of hazardous energy from machines and equipment during servicing or maintenance

---

## Introduction

This procedure applies to facilities and projects where employees are engaged in the cleaning, repairing, servicing, setting-up, or adjusting of machinery, equipment, or processes that could start up unexpectedly or release stored energy.

Erie County Water Authority understands that employees face severe injuries, such as amputations, fractures, or even death, if this energy and start-up are not controlled.

Erie County Water Authority is committed to taking every precaution to protect employees, including establishing procedures for removing the energy supply from machines and equipment, for applying the appropriate lockout devices on the energy-isolating devices, for addressing stored or potentially accumulated energy, and for training and program review.

Erie County Water Authority complies with local, state, and federal regulations and follows best practices.

### Terms:

- **Energy-isolating device:** A mechanical device that physically prevents the transmission or release of energy
- **Hardware:** A device that connects directly to the energy-isolating device
- **Zero energy state:** The point at which all sources of energy are removed
- **Authorized employees:** Employees who lockout machines or equipment in order to perform servicing or maintenance
- **Affected employees:** Employees whose jobs require them to operate or use machines or equipment that need servicing or maintenance and are in the lockout program
- **Qualified person** means person who is familiar with the construction and operation of the equipment and the hazards involved

# Lockout Procedures

## Topic outline:

Responsibilities.....	2
Authorization Levels.....	3
Hazard Assessment.....	4
PPE Requirements.....	5
Training.....	5
Lock and Tag Requirements.....	6
Energy Control Procedures.....	7
Audit.....	10
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## Responsibilities

### Management:

Management is responsible to support the lockout plan.

### Plan administrator:

**Chief WTPO** shall administrate the Lockout Plan for Erie County Water Authority. The plan administrator has the following responsibilities:

- Assure that a specific procedure for controlling the energy and locking out each machine and piece of equipment exists
- Assuring that authorized and affected employees complete the correct training
- Assuring that qualified persons are assigned to supervise lockout procedures
- Coordinating the continuation of lock protection through shift or personnel changes
- Requiring that all locks are keyed differently and that only one key exists for each lock and remains in the possession of the authorized employee to whom it has been assigned
- Coordinating all lockout and energy control activities with client, owner, contractor, and subcontractor practices and programs
- Assuring that both the organization’s energy control plan and the control plan of a contractor or subcontractor are understood and followed by employees

# Lockout Procedures

- Assuring that locks and tags are in good condition and are replaced if needed
- Maintaining appropriate documentation

## **Supervisors of lockout:**

**Qualified persons** shall act as front-line supervisors of lockout procedures. They have the following responsibilities:

- Observe de-energizing and the entire lockout process
- Enforcing appropriate procedures
- Verifying that the equipment cannot be restarted after being locked out
- Conducting tests and visual inspections prior to re-energizing to assure safety
- If applicable, overseeing group lockout

## **Authorized employees are responsible for:**

- Completing the appropriate level of training on lockout
- Following all procedures when locking and tagging out machines

## **Affected employees are responsible for:**

- Completing the appropriate level of training on lockout
- Never working on a machine that is locked out and never tampering with a lock or tag

## **Contractors or outside servicing personal are responsible for:**

- Following the lockout standard and complying with Erie County Water Authority's program
- Exchanging information with the employer about their energy control program

## **Authorization Levels**

The following is the ECWA Authorization levels for accessing Electrical Equipment

# Lockout Procedures

<b>LEVEL 1</b>	34,500 and Below - Including Sub-Station Breakers
Electrical Engineer	Scott Aiple
Crew Chief - Pump Mechanic	Scott Klubek

<b>LEVEL 2</b>	4160 and Below - Limited to 4160 Volt Pump Disconnect Switches, 480 Volt Distribution Breakers, Lighting Panel Breakers - <b>No Sub-Station Breakers!!! ACCESS INSIDE ELECTRICAL COMPARTMENTS PERMITTED!!!</b>
Instrumentation	Hank Michnik Brett Stockdale John Mattison

<b>LEVEL 3</b>	4160 and Below - Limited to 4160 Volt Pump Disconnect Switches, 480 Volt Distribution Breakers, Lighting Panel Breakers - <b>No Sub-Station Breakers!!! ACCESS INSIDE ELECTRICAL COMPARTMENTS NOT PERMITTED!!!</b>
Crew Chief - Treatment Plants	Russ Bradley
Production Technician	Paul Miklos
Crew Chief - Control	Steve Noyes
Generator Mechanics	Jim Shimo Mike Lee
Senior Production Engineer	NAME

<b>LEVEL 4</b>	480 and Below - Limited to 480 Volt Pump Disconnect Switches, 480 Volt Distribution Breakers, Lighting Panel Breakers - <b>No Sub-Station Breakers!!! ACCESS INSIDE ELECTRICAL COMPARTMENTS NOT PERMITTED!!!</b>
Treatment Plant Operator	Service Center
Treatment Plant Operator	Sturgeon Point
Control Operators	Van de Water
Pump Mechanics	Steve Mason
	David Juda

# Lockout Procedures

## Hazard Assessment

Chief WTPO shall conduct the hazard assessment to determine all the sources of hazardous energy to be controlled. This will facilitate creating specific procedures of energy control.

- Hazardous energy types include the following: electrical, mechanical, chemical, hydraulic, and pneumatic
- In addition, the assessment will consider the following: stored or potential energy, thermal sources, and human factors

## Personal Protective Equipment

As per NFPA 70e (2015), the chart below contains the Category and Level of protection when accessing Electrical Equipment.

<b>PPE Category*: 1 &lt;240 Volts</b>
<b>Clothing Description:</b> Arc-rated clothing (see note 1) Minimum ATPV Rating Cal/cm <sup>2</sup> : <b>4</b> <b>Required Garments:</b> Shirt (long sleeve) and pants (long) or coverall; Flash suit hood or faceshield (see note 2); Jacket, parka, rainwear, or hardhat liner (AN) <b>Required Protective Equipment:</b> Hard hat; Safety glasses or goggles (SR); Hearing protection (ear canal inserts); Heavy-duty leather gloves (see note 3); Leather footwear (AN)
<b>PPE Category*: 2 &gt;240 Volts</b>
<b>Clothing Description:</b> Arc-rated clothing (see note 1) Minimum ATPV Rating Cal/cm <sup>2</sup> : <b>8</b> <b>Required Garments:</b> Shirt (long sleeve) and pants (long) or coverall; Flash suit hood or faceshield (see note 2) and balaclava; Jacket, parka, rainwear, or hardhat liner (AN) <b>Required Protective Equipment:</b> Hard hat; Safety glasses or goggles (SR); Hearing protection (ear canal inserts); Heavy-duty leather gloves (see note 3); Leather footwear
<b>PPE Category*: 3 &lt;600 Volts</b>
<b>Clothing Description:</b> Arc-rated clothing system (see note 1) Minimum ATPV Rating Cal/cm <sup>2</sup> : <b>25</b> <b>Required Garments:</b> Shirt (long sleeve) (AR); Pants (long) (AR); Coverall (AR); Flash suit jacket (AR); Flash suit pants (AR); Flash suit hood; Gloves (see note 1); Jacket, parka, rainwear, or hard hat liner (AN) <b>Required Protective Equipment:</b> Hard hat; Safety glasses or safety goggles (SR); Hearing protection (ear canal inserts); Leather footwear
<b>PPE Category*: 4 &gt;1000 Volts</b>
<b>Clothing Description:</b> Arc-rated clothing system (see note 3) Minimum ATPV Rating Cal/cm <sup>2</sup> : <b>40</b> <b>Required Garments:</b> Shirt (long sleeve) (AR); Pants (long) (AR); Coverall (AR); Flash suit jacket (AR); Flash suit pants (AR); Flash suit hood; Gloves (see note 1); Jacket, parka, rainwear, or hard hat liner (AN) <b>Required Protective Equipment:</b> Hard hat; Safety glasses or safety goggles (SR); Hearing protection (ear canal inserts); Leather footwear

This new PPE category table no longer references a category 0.

# Lockout Procedures

AN: as needed (optional). AR: as required. SR: selection required.

## Notes:

- (1) Arc rating is defined in article 100. (2) Face shields are to have wrap-around guarding to protect not only the face but also the forehead, ears and neck, or, alternatively, an arc-rated arc flash suit hood is required to be worn. (3) If rubber insulating gloves with leather protectors are used, additional leather or arc-rated gloves are not required. The combination of rubber insulating gloves with leather protectors satisfies the arc flash protection requirement.
- (2) Face shields are to have wrap – around guarding to protect not only the face but also the forehead, ears, and neck, or, alternatively, an arc – rated arc flash suit hood is required to be worn.
- (3) If rubber insulating gloves with leather protectors are used, additional leather or arc – related gloves are not required. The combination of rubber insulating gloves with leather protectors satisfies the arc flash protection requirement.

## Training

**Coordinator of Employee Relations** shall administrate the training program for **Erie County Water Authority** and keep training records. Written certification will be required to assure employees have been trained.

### For affected employees:

- Purpose and use of energy control procedures
- How to recognize when a procedure is being used
- Who is authorized to perform work
- That restarting locked or tagged-out equipment is prohibited

### For authorized employees:

In addition to the awareness-level training, authorized employees must know:

- Policies and procedures of the energy control program



## Lockout Procedures

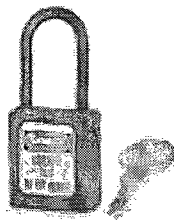
- Type and magnitude of hazardous energy sources
- The methods and means necessary for energy isolation and control

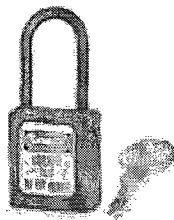
### Employees will be retrained in lockout procedures:

- When there is a change in their job assignment
- When changes in machines, equipment or processes that present a new hazard
- Where there is a change in the actual energy control (lockout) procedures
- At least on an annual basis to assure that all are aware of the procedures.

## Lock and Tag Requirements

- **All devices** must be:
  - Durable.
  - Standard in color, shape, and appearance.
  - Substantial enough to prevent accidental removal. (Tags must have a minimum unlocking strength of 50 lbs.)
  - Labeled with the authorized employee's name.
  - Lock sets will be provided with a single key. All other keys will be discarded.



- Our Locking devices look like this 
- **Tags** – Will not be used by the Erie County Water Authority

# Lockout Procedures

## Energy Control Procedures

Employees shall not work on or in equipment, vessels, etc., which are **not** in a zero energy state. Only authorized employees may perform lockout.

### Preparing for shutdown:

- Identify and locate all sources of energy that could affect individuals involved.
- Notify affected employees of activities.
  - This can be done verbally, visually, or by hanging a warning tag on the control panel.
- Identify shutdown procedures.
- Identify energy isolation devices needed.
- Determine quantity and type of lockout devices required.

### Shutdown:

- Shut equipment down by its normal start/stop method.

### Isolating energy sources:

- Use energy-isolating devices appropriate for the energy source, such as:
  - Manually-operated circuit breakers or electrical disconnects for electrical energy.
  - Valves for pneumatic energy.
  - Blocking or bars for mechanical energy.
- All devices must be equipped with a place to attach a hasp or a lock or have a built-in locking mechanism.

### Applying locks and tags:

- Locks are attached so that the device cannot be operated until locks are removed.
- Devices must be in the off position.
- Tags indicate that the device and equipment may not be operated and include the name of employees working on the equipment.
- Locks, tags, signs, and seals must be securely attached.
- The name of the authorized employee must be included.

# Lockout Procedures

## **Control residual energy:**

- Release, restrain, or dissipate energy.
- Prevent the re-accumulation of energy.
- Isolate the space:
  - Blind the lines.
  - Disconnect and misalign the lines.
  - Double block the valves and bleed the residual materials.

## **Verify energy control methods:**

- Assure that switches, valves and other mechanisms cannot be turned on.
- Activate equipment control switches and levers, and depress start buttons to assure the power is isolated.
- Return switches, levers, and buttons to the off position.
- Use a meter to assure that electrical energy is not present.

## **Appropriate start-up procedures:**

- Inspect area and remove all tools, rags, and other materials.
- Assure that equipment is operationally intact.
- All guards and other safety devices are replaced, if applicable.
- Notify affected employees that equipment will be restarting.
- Check work area to assure all employees are safely positioned.
- Verify all controls are in the neutral or off position.
- Remove lockout devices.
- Notify affected employees that lockout devices have been removed and the equipment or machinery is ready for use.

# Lockout Procedures

## Group lockout:

When a crew or other group performs service or maintenance on equipment, a single authorized employee must assume the overall responsibility for the control of hazardous energy for all members of the group while the servicing or maintenance work is in progress, and implement the group lockout energy control procedure.

- Each person who enters the danger zone will be required to verify that the hazardous energy sources have been locked out and the keys to these locks have been secured in a group lockout box.
- Then they will affix their personal devices to the group lockout box or equivalent.
- For example, multiple valves and breakers require lockout by three people who will be working on the same piece of equipment. A lock and tag is placed on each lockout location and the keys are stored in a group lockout box. Each employee then places their personal locks on the group lockout box.
- Group lockout procedure must provide all employees **with the same level of protection** provided by an individual lockout device.

## Lockout occurring over multiple shifts:

- Protection must extend between shifts.
- If work extends through the initial shift:
  - The incoming staff that will be working on the process or equipment must add their own lockout controls in accordance with standard lockout procedures.
  - The outgoing shift staff must review all work done and the status of lockouts, and transfer the responsibility of lockout to the incoming shift.

## Temporary operation of locked out source:

Temporary operation may be required for certain tasks, such as tests. These steps must be done by authorized employees only.

- Make sure everyone is clear of the system.
- Make sure tools are clear.
- Remove locks and tags.
- Energize the system and conduct the test if applicable.

## Lockout Procedures

- Immediately de-energize the system and replace locks.

### When employee is not available:

Unauthorized removal of lock and tag is prohibited. Use the following procedure for a **competent, qualified, and approved person** to remove locks and tags.

- Verify that the authorized employee is not on site and available to remove the lock and tag. Attempt to contact the authorized employee. If they cannot be contacted, continue as below.
- Verify equipment is safe to operate, tools have been removed, and guards have been replaced.
- Notify affected employees that equipment will be restarting, and check work area to assure all employees are safely positioned.
- Verify all controls are in the neutral or off position.
- Remove lock/tag and energize equipment.
- Notify affected employees that lockout devices have been removed and the equipment or machinery is ready for use.
- **Before the authorized employee who could not be contacted earlier resumes work, he or she must be informed that the lockout device has been removed.**

### Audit

The purpose of the audit is to make continuous improvements and needed corrections.

- The audit is conducted:
  - At least annually.
  - If a weakness or issue is noted.
- Audits are performed by authorized employees.
- Audits review the following:
  - Adherence to energy isolation procedures
  - Effectiveness of lockout procedures
  - Employee training
  - Assigned roles and responsibilities
  - The authorized person's responsibilities

---

# Lockout Procedures

## **Audit process:**

An authorized employee who is not involved in the lockout procedure for the equipment being inspected will conduct the review and inspection.

- Review equipment to assure that lockout is effective and safe.
- Authorized employees will be subject to an oral review of machine-specific lockout procedures for equipment that they are authorized to service. This review will address that employee's responsibilities under the lockout procedure for each piece of machinery that he/she is authorized to work on.
- Authorized employees will also be subject to an observed evaluation of their proficiency in controlling hazardous energy on selected equipment that they are authorized to service.
- Any deficiencies must be corrected.

## **Documentation:**

Audits must be documented and the records maintained.

Each audit needs to be certified by the employer. The certificate must include the following information: the equipment being controlled, the date of review, the names of employees involved, and the name of the auditor.

Records should also include information about the pieces of equipment, problems observed, and recommendations to correct those problems.

## **Violations**

The consequences of violating this policy can be severe in terms of human suffering and loss. Violations of this policy will be handled aggressively, with a goal of determining how to improve the employee behaviors and procedures so that no similar violation will occur.

# Lockout Procedures

## Appendix A: Lockout Program Audit Report

	OK	Improvement Needed
1. The written program is developed and accessible.	<input type="checkbox"/>	<input type="checkbox"/>
2. Awareness-level training is provided to affected employees.	<input type="checkbox"/>	<input type="checkbox"/>
3. Full lockout training with lockout procedures for specific machinery and equipment is provided to authorized employees.	<input type="checkbox"/>	<input type="checkbox"/>
4. Skills evaluations are done as part of training.	<input type="checkbox"/>	<input type="checkbox"/>
5. Lockout supplies are readily available and good quality.	<input type="checkbox"/>	<input type="checkbox"/>
6. Locks are individually keyed.	<input type="checkbox"/>	<input type="checkbox"/>
7. Tags are readable and understandable, identify who is performing lockout, and contain instructions not to operate or energize equipment.	<input type="checkbox"/>	<input type="checkbox"/>
8. Lockout is performed for de-jamming activities.	<input type="checkbox"/>	<input type="checkbox"/>
9. Lockout is effective in that no employee can reach in or come into contact with areas where injury could occur.	<input type="checkbox"/>	<input type="checkbox"/>
10. The program addresses all applicable stored energies.	<input type="checkbox"/>	<input type="checkbox"/>
11. Specific lockout procedures are developed for each piece of machinery and posted on each piece of machinery.	<input type="checkbox"/>	<input type="checkbox"/>
12. Lockout procedures are included for vehicles and mobile equipment.	<input type="checkbox"/>	<input type="checkbox"/>
13. Front-line supervisory staff observes employee behavior and enforces the lockout procedures.	<input type="checkbox"/>	<input type="checkbox"/>
14. Audits take place annually or more frequently.	<input type="checkbox"/>	<input type="checkbox"/>



<b>Date</b>	<b>Audit by</b>
-------------	-----------------

### Corrective Actions Needed

<b>Actions and Responsible Persons</b>
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# Lockout Procedures

## Appendix B: Lockout Information Placard

<b>Equipment or Process:</b>			
<b>Location of Equipment:</b>			
<b>Date prepared :</b>		<b>Prepared by:</b>	
<b>Authorization Level</b>			
<b>Minimum PPE</b>			
<b>Special Hazards</b>			
<b>Special Procedures</b>			
<b>Energy Sources</b>	<b>Isolation Procedure</b>		<b>Lockout Device</b>
<b>Electrical</b>			
	<b>Process Steps:</b>		
	Photo	1)	
<b>Verification</b>	1)		
<b>Restart Procedure</b>	1)		
<b>Pneumatic</b>			
	<b>Process Steps:</b>		
	Photo	1)	
<b>Verification</b>	1)		



# Lockout Procedures

<b>Restart Procedure</b>	1)	
<b>Hydraulic</b>		
	<b>Process Steps:</b>	
	Photo	1)
<b>Verification</b>	1)	
<b>Restart Procedure</b>	1)	
<b>Other Energy Source</b>		
	<b>Process Steps:</b>	
	Photo	1)
<b>Verification</b>	1)	
<b>Restart Procedure</b>	1)	
	1)	
<b>Notes</b>		
All equipment should be running as usual after repairs		

**DO NOT REMOVE THIS TAG FROM ANY MACHINE!**



# ECWA Lockout/Tagout Energy Control Procedure

**Equipment or Process:** Mixer 1 – Coagulation Basin

**Location of Equipment:** Sturgeon Point – Decant Building


**Date prepared :** 9/2/2016

**Prepared by:**

**Authorization Level:** 480 and Below - Limited to 480 Volt Disconnect Switches, 480 Volt Distribution Breakers, Lighting Panel Breakers - No Sub-Station Breakers!!!

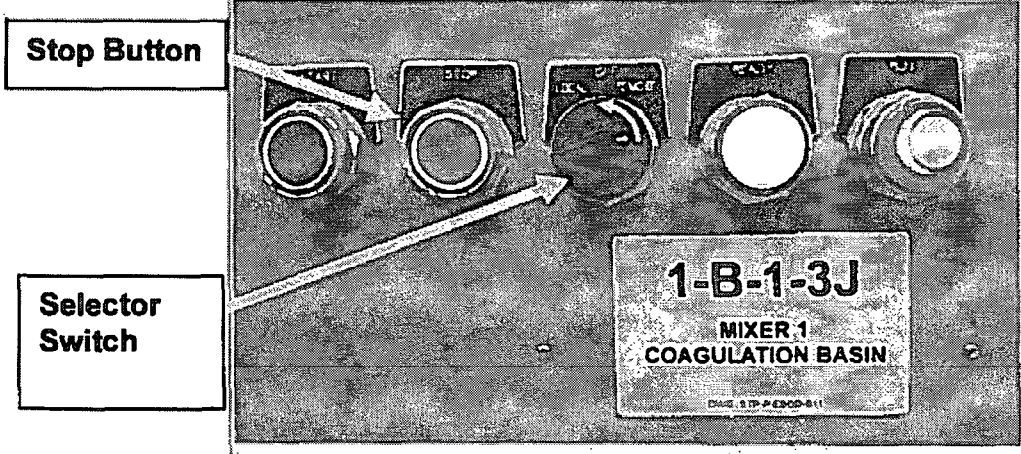
**Minimum PPE Category 1:** Natural fiber clothing, safety glasses, hearing protection.

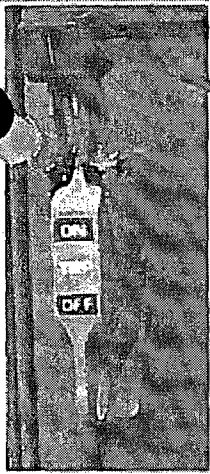
Energy Sources	Isolation Procedure	Lockout Devices
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<b>Electrical</b>	Dedicated Disconnects:  1. Unit controls in dedicated electrical room in Decant building	  (1)
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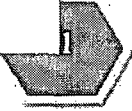
**Process Steps:**

- 1) Notify board operator of lockout
- 2) Notify affected employees of lockout
- 3) Stop mixer in SCADA
- 4) Press "Stop" button on 1-B-1-3J panel
- 5) Place selector switch on panel to "Local" position





**Disconnect**



6) Pull down handle



on disconnect at panel.

- 7) Place lock in lock hasp to perform lockout
- 8) Record in lockout book

**Verification**

- 1) After locking out, press motor start button on control panel
- 2) If motor does not start, Lockout has been properly performed

**Restart Procedure**

- 1) Ensure the equipment has been fully assembled
- 2) Ensure all tools have been removed from the area
- 3) Ensure all guards are back in place
- 4) Ensure area is clear of persons
- 5) Notify all affected associates of the motor being re-energized
- 6) Proceed to disconnect panel and remove lock (E1), and raise handle to "On"
- 7) Return to electrical room and place selector switch to "Remote" position
- 8) Start motor through SCADA
- 9) Check to verify motor is properly operating
- 10) Return to normal state of operation

**Notes**

All equipment should be running as usual after repairs

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**SECTION 01 78 23**  
**OPERATIONS & MAINTENANCE DATA**

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**PART 1 - GENERAL**

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**1.1 DESCRIPTION**

- A. Provide operation and maintenance data, in accordance with this Section and in accordance with requirements elsewhere in the Contract Documents, for use as instructional and reference manuals by operations and maintenance personnel at the Site.
- B. The required operation and maintenance data is specified in individual Sections of the Contract Documents. At a minimum, provide operation and maintenance data for:
  - 1. All equipment and systems.
  - 2. Valves, gates, actuators, and related accessories.
  - 3. Instrumentation and control devices.
  - 4. Electrical gear.
- C. For each operation and maintenance manual, submit the following:
  - 1. *Preliminary Submittal: Printed and bound copy of entire operation and maintenance manual, except for test data, service reports by manufacturer's representative, and electronic copies.*
  - 2. *Final Submittal: Printed and bound copy of complete operations and maintenance manual, including test data and service reports by the manufacturer's representative, with electronic copies.*
- D. Prepare each operations and maintenance manual specifically for the Project. Include in each manual all pertinent instructions, as-built drawings (as applicable), bills of materials, installation and handling requirements, maintenance and repair instructions, and other printed materials required to provide accurate and comprehensive information for safe and proper operation, maintenance, and repair of equipment furnished for this Project. Include specific information required by applicable Specification Sections, and all data required by Laws and Regulations.

**1.2 NUMBER OF COPIES AND TIMING OF SUBMITTALS:**

- A. Preliminary Submittal:
  - 1. Electronic Copies: One (1) copy, comply with the submittal procedures of Section 01 33 00 for electronic format.
  - 2. Provide submittal to Engineer within 30 days prior to either start up or substantial completion.
- B. Final Submittal:
  - 1. Provide the final submittal prior to Final Completion, unless otherwise specified in the Contract Documents.
  - 2. Printed Copies: Six (6) copies, exclusive of copies required by the Contractor.
  - 3. Electronic Copies: One (1) copy. Comply with the submittal procedures of Section 01 33 00 for electronic format.



### 1.3 FORMAT OF HARDCOPIES

- A. Binding and Cover:
1. Bind each operation and maintenance manual in durable, permanent, stiff-cover binder(s), comprising one or more volumes per copy as required. Binders shall be minimum one-inch wide and maximum of three-inch wide.
  2. Binders shall be locking three-ring or three-post type. Three-ring binders shall be riveted to back cover and include plastic sheet lifter (page guard) at front of each volume.
  3. Do not overfill binders.
  4. Covers shall be oil, moisture, and wear resistant, and include identifying information on the cover and spine of the manual.
  5. Provide the following information on the cover of each volume:
    - a. Title, "OPERATING AND MAINTENANCE INSTRUCTIONS".
    - b. Name or type of equipment covered in the manual.
    - c. Volume number, if more than one volume is required.
    - d. Name of Project and, if applicable, contract name and number.
  6. Provide the following information on the spine of each volume:
    - a. Title, "OPERATING AND MAINTENANCE INSTRUCTIONS".
    - b. Name or type of equipment covered in the manual.
    - c. Volume number, if more than one volume is required.
- B. Pages:
1. Print pages in manual on 30-pound (minimum) paper, 8.5 inches by 11 inches.
  2. Provide each page with binding margin of at least one inch wide. Punch each page with holes suitable for the associated binding.
- C. Drawings:
1. Bind drawings, diagrams, and illustrations into the manual using paper 11 by 17 inches in size, or smaller.
  2. Documents larger than 11 inches by 17 inches shall be folded and inserted into clear plastic pockets bound into the manual. Mark pockets with printed text indicating content and drawing numbers. Provide no more than three drawings per pocket.
- D. Copy Quality and Document Clarity:
1. Material shall be either original manufacturer-printed materials or first-generation photocopies indistinguishable from originals. Manuals that contain copies that are not clear, not completely legible, off-center, skewed, or where text or drawings are cut by binding holes, will be rejected. Pages that contain approval or date stamps, comments, or other markings that cover text or drawing are unacceptable. Faxed copies are unacceptable.
  2. Clearly mark in ink all components of equipment on catalog pages for ease of identification. In standard or pre-printed documents, indicate options provided or cross out inapplicable material. Use of highlighters is unacceptable.
- E. Organization:
1. Table of Contents:



- a. Provide a table of contents in each volume of each operations and maintenance manual.
  - b. In the table of contents and at least once in each chapter or section, identify products by their functional names. Thereafter, abbreviations and acronyms may be used if their meaning is explained in a table bound at or near the end of each volume. Using product model or catalog designations for identification is not acceptable.
2. Use dividers and indexed tabs between major categories of information, such as operating instructions, preventive maintenance instructions, and other major subdivisions of data in each manual.

#### 1.4 FORMAT OF ELECTRONIC COPIES

- A. Electronic Copies of Manuals:
  1. The electronic copy shall include all the information provided in the hardcopy.
  2. Provide each electronic copy on a separate compact disc (CD).
  3. File Format:
    - a. Files shall be in "portable document format (PDF)". Files shall be electronically searchable.
    - b. Provide a separate file for each separate document in the hardcopy.
    - c. Within each file, provide bookmarks for the following:
      - 1) Each chapter and subsection listed in the hardcopy's table of contents.
      - 2) Each figure.
      - 3) Each table.
      - 4) Each appendix.
- B. Copies of Programming and Configuration Files:
  1. Provide a CD copy of all software programming, such as programmable logic controller programs, prepared specifically for the Project. Third-party, commercially available software is excluded from requirements of this article; provide copies of commercially-available, third-party software as specified in the Contract Documents.
  2. Provide CD copies of system configuration prepared specifically for the Project, such as SCADA display configurations.
  3. Number of copies shall be as specified for electronic copies of operation and maintenance data.

#### 1.5 CONTENT

- A. Provide complete, detailed, written operating instructions for each equipment including: function; operating characteristics; limiting conditions; operating instructions for start-up, normal conditions and emergency conditions; regulation and control; operational troubleshooting; and shutdown. Also, include, as applicable, written descriptions of alarms generated by the equipment and proper responses to such alarm conditions.
- B. Provide written explanations of all safety considerations relating to operation and maintenance procedures.
- C. Provide complete, detailed, written preventive maintenance instructions including all information and instructions to keep the equipment or system properly lubricated, adjusted,



and maintained so that the equipment functions economically throughout its design life. Instructions shall include:

1. Written explanations with illustrations for each preventive maintenance task such as inspection, adjustment, lubrication, calibration, and cleaning. Provide pre-startup checklists for each equipment item and maintenance requirements for long-term shutdowns.
  2. Recommended schedule for each preventive maintenance task.
  3. Lubrication
    - a. The Contractor shall furnish the Owner a lubrication chart(s) for all equipment furnished or installed by the Contractor. The chart(s) shall include the following for each item of equipment:
      - 1) name of the item;
      - 2) location of the item;
      - 3) each point of lubrication on the item;
      - 4) for each point of lubrication, the identification of the lubricant recommended and the recommended frequency of lubrication.
    - b. The information on the chart(s) shall be developed from manufacturers' printed data or from manufacturers' specific recommendations.
    - c. The identification of the lubricant by manufacturer's name and product identification number (such as Mobil X421) shall be furnished. Unless otherwise stated the name of the manufacturer to be used will be furnished to the Owner by the Contractor.
    - d. Following the initial operation of the equipment the Contractor shall re-lubricate, changing and adding lubricants, at the intervals or frequency as recommended by the manufacturer until acceptance.
  4. Table of alternative lubricants.
  5. Troubleshooting instructions.
  6. List of required maintenance tools and equipment.
- D. Complete bills of material or parts lists for equipment provided. Lists or bills of material may be provided on a per-drawing or per-equipment assembly basis. Bills of material shall indicate:
1. Manufacturer's name, address, telephone number, fax number, and Internet website address.
  2. Manufacturer's local service representative's or local parts supplier's name, address, phone number, fax number, and e-mail address, if applicable.
  3. The following information for each part or piece provided:
    - a. Parts cross-reference number. Cross-reference number shall be used to identify the part on the assembly drawing, Shop Drawing, or other type of illustration where the part is clearly shown.
    - b. Part name or description.
    - c. Manufacturer's part number, serial number and shop order number.
    - d. Quantity of each part used in the assembly.
    - e. Current unit price of the part at the time the operations and maintenance manual





is submitted. Price list shall be dated.

- E. Complete instructions for ordering replacement parts, including reference numbers (e.g., shop order or serial number) that will expedite the ordering process.
- F. Manufacturer's recommended inventory levels for spare parts and consumable supplies for the first two years of operation. Consumable supplies are those items consumed or worn during the operation of the equipment, and items used in maintaining the equipment such as lubricants and seals. Provide estimated delivery times, shelf life limitations, and special storage requirements.
- G. Provide manufacturer's installation and operation bulletins, diagrams, schematics, and equipment cutaways. Avoid providing catalog excerpts unless they are the only material available showing the equipment. Where materials pertain to multiple models or types, mark the literature to indicate specific equipment supplied.
- H. Provide original-quality copies of each approved and accepted Shop Drawing and submittal, updated to as-installed condition. Reduced drawings are permissible only if reduction is to not less than one-half original size and all lines, dimensions, lettering, and text are completely legible on the reduction.
- I. Provide electrical schematic and wiring diagrams, including complete point-to-point wiring and wiring numbers or colors between all terminal points.
- J. Copy of warranty and/or service contract as applicable.
- K. When copyrighted material is used in the operations and maintenance manual, obtain the copyright holder's written permission to use such material in the operation and maintenance manual.

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

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

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**END OF SECTION**



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**SECTION 01 78 40**  
**PROJECT RECORD DOCUMENTS**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for project record documents, including the following:
  - 1. As-Built Drawings
  - 2. Miscellaneous record submittals
- B. Requirements in this Section are in addition to those specified in the General Conditions.

**1.2 SUBMITTALS**

- A. Contractor shall submit the following in accordance with the General Conditions and Division 01 specifications:
  - 1. Submit copies of As-Built Drawings as follows:
    - a. Submit one paper copy set of marked-up record prints. Engineer will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
- B. Miscellaneous Record Submittals: Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

**PART 2 - PRODUCTS**

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**2.1 AS-BUILT DRAWINGS**

- A. Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings.
  - 1. Preparation: Mark record prints to show where installation varied from that shown originally. Require individual or entity who obtained record data, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Record data as soon as possible after obtaining it.
    - c. Record and check the markup before enclosing concealed installations.
    - d. Cross-reference record prints to corresponding archive photographic documentation.
  - 2. Content: Types of items requiring marking include, but are not limited to:
    - a. Dimensional changes to Contract Drawings.
    - b. Revisions to details shown on Contract Drawings.
    - c. Depths of foundations below first floor.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.



- g. Actual equipment locations.
  - h. Duct size and routing.
  - i. Locations of concealed internal utilities.
  - j. Changes made by Change Order or Work Change Directive.
  - k. Changes made following the Engineer's written orders.
  - l. Details or information not on the original Contract Drawings.
  - m. Field records for variable and concealed conditions.
  - n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information.
  4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
  5. Note Work Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Newly Prepared As-Built Drawings: Prepare new Drawings instead of preparing As-Built Drawings where the Engineer determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
  2. Consult the Engineer for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into As-Built Drawing sets.
- C. Format: Identify and date each record Drawing and include the designation "AS-BUILT DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  2. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification.
  3. Identification number: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "AS-BUILT DRAWINGS."
    - d. Name of Engineer.
    - e. Name of Contractor

## 2.2 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping. Bind or file miscellaneous records and identify each.
- B. Format: Submit miscellaneous record submittals as a PDF electronic file.
  1. Organize miscellaneous record submittals by Specification Section number and title.

**PART 3 - EXECUTION**

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**3.1 RECORDING AND MAINTENANCE**

- A. Recording: Maintain one copy of each submittal during the construction period for project recording purposes. Post changes and modifications to project record documents as they occur; do not wait until the end of the Project.
- B. Maintenance of Record Documents and Samples: Store record documents in the field office apart from the Contract Documents used for construction. Do not use Project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project record documents for the Engineer's reference during normal working hours.

**END OF SECTION**



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## SECTION 01 79 00 DEMONSTRATION AND TRAINING

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### PART 1 - GENERAL

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#### 1.1 SUMMARY

##### A. Scope:

1. Contractor shall furnish the services of the Manufacturer's operation and maintenance training specialists to instruct and demonstrate to the Owner's personnel the recommended operations and maintenance procedures for materials and equipment furnished, in accordance with the Contract Documents.
2. Manufacturer shall provide a combination of classroom and field training. All training shall be conducted at the Site, unless otherwise stated in the equipment Sections. Class size shall be limited to no more than 15 trainees. Manufacturer shall provide training for all plant shifts, or as approved by Owner.
3. Owner reserves the right to record training sessions on video for Owner's future use in instructing Owner's personnel.

##### B. Scheduling of Training Sessions:

1. Contractor shall coordinate training services with start-up and initial operation of materials and equipment on days and at times, acceptable to Owner, in accordance with the Contract Documents.
2. Training of Owner's personnel shall commence after acceptable preliminary operation and maintenance data has been submitted and approved.
3. Contractor shall prepare and submit a proposed training schedule for review and acceptance by the Engineer and Owner. Proposed training schedule shall show all training required per the Contract Documents, and shall demonstrate compliance with specified training requirements relative to number of hours of training, number of training sessions, and scheduling.

#### 1.2 SUBMITTALS

##### A. Contractor shall submit the following in accordance with the General Conditions and Division 01 specifications.

1. Proposed lesson plan for each scheduled training session, including the estimated length of instruction time, a minimum of fourteen (14) days prior to the commencement of training. Lesson plans shall be approved a minimum of seven (7) days prior to scheduled training.
2. Credentials of the designated operations and maintenance instructor. Credentials shall include a brief resume and specific details of the instructor's experience pertaining to operation of, maintenance of, and training for the equipment specified.
3. Submit a written training request to the Engineer a minimum of thirty (30) days prior to the requested training date.
4. At completion of training, submit complete training manual(s) and demonstration and training video recordings for Owner's use.



### 1.3 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative from the manufacturer, experienced in operation and maintenance procedures and training.

### 1.4 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate content of training modules with content of approved operation and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by the Engineer.
- C. Engineer will submit proposed program content to the New York Water Environment Association for approval as operator certification credits.

## PART 2 - PRODUCTS

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### 2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for each piece of equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that each participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
  - 1. System overview: Include the following:
    - a. System, sub-system, and equipment descriptions.
    - b. Operating standards.
    - c. Regulatory requirements
    - d. Equipment function.
    - e. Operating characteristics.
    - f. Limiting conditions.
  - 2. Documentation: Review the following items in detail:
    - a. Emergency manuals.
    - b. Operations manuals.
    - c. Maintenance manuals.
    - d. Project record documents.
    - e. Identification systems.
    - f. Warranties.
  - 3. Operations: Include the following, as applicable:
    - a. Startup procedures





- b. Equipment or system break-in procedures.
  - c. Routine and normal operating instructions.
  - d. Regulation and control procedures.
  - e. Control sequences.
  - f. Safety procedures.
  - g. Instructions on stopping.
  - h. Normal shutdown instructions.
  - i. Operating procedures for emergencies including the meaning of warnings, trouble indications, and error messages.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Operating instructions for conditions outside of normal operating limits.
  - l. Seasonal and weekend operating instructions.
  - m. Required sequences for electric or electronic systems.
  - n. Special operating instructions and procedures.
4. Adjustments: Include the following:
- a. Alignments.
  - b. Noise and vibration adjustments.
  - c. Economy and efficiency adjustments.
5. Troubleshooting: Include the following:
- a. Diagnostic instructions.
  - b. Test procedures.
6. Maintenance: Include the following:
- a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning.
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
7. Repairs: Include the following:
- a. Repair instructions.
  - b. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - c. Instructions for identifying parts and components.
  - d. Review of spare parts needed for operation and maintenance.



## 2.2 TRAINING AIDS

- A. The manufacturer's instructor shall incorporate training aids as appropriate to assist in the instruction. At a minimum, the training aids shall include text and figure handouts. Other appropriate training aids are:
  - 1. Audio-Visual Aids (*e.g.* films, slides, videotapes, overhead transparencies, posters, blueprints, diagrams, catalog sheets)
  - 2. Equipment cutaways and samples (*e.g.* spare parts and damaged equipment).
  - 3. Tools (*e.g.* repair tools, customized tools, measuring and calibrating instruments).
- B. The manufacturer's instructor shall utilize descriptive class handouts during the instruction. Photocopied class handouts shall be good quality reproductions. Class handouts should accompany the instruction with frequent reference made to them. Customized handouts developed especially for the instruction are encouraged. Handouts planned for the instruction shall be attached with the manufacturer's proposed lesson plan.
- C. Audio-visual Equipment: Training provider shall provide audio-visual equipment required for training sessions. Audio-visual equipment that training provider shall provide, as required, includes:
  - 1. Laptop computer, presentation software, and suitable projector
  - 2. Extension cords and spare bulb for projector, if needed.

## PART 3 - EXECUTION

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### 3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including training aids. Assemble handouts and other training aids into a training manual.

### 3.2 INSTRUCTION

- A. Instructors shall instruct the Owner's personnel to adjust, operate, and maintain systems, sub-systems, and equipment not part of a system.
- B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.
- C. Cleanup: Collect used and leftover educational materials and provide to Owner. Remove instructional equipment. Restore systems and equipment to the condition existing before initial training use.

### 3.3 DEMONSTRATION AND TRAINING

- A. Allow Owner to videotape demonstration and training sessions, for internal use only.

**3.4 SCHEDULE OF TRAINING REQUIREMENTS**

Equipment	Specification Section	Training Hours		
		Operators	Mechanics	I & E
Mixers	46 33 15	1 session 8 hours / session	1 session 8 hours / session	1 session 4 hours / session
Diaphragm Pumps	46 33 42	2 sessions 4 hours / session	2 sessions 4 hours / session	1 session 4 hours / session
Air Compressors	43 12 11	1 sessions 4 hours / session	1 sessions 4 hours / session	----- .

**END OF SECTION**



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**SECTION 01 87 13**  
**EQUIPMENT PERFORMANCE PERIOD**

---

**PART 1 - GENERAL**

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**1.1 DESCRIPTION**

- A. Scope:
1. CONTRACTOR shall operate the specified equipment in continuous service without failure to perform or interruption due to equipment malfunction of any kind for an Equipment Performance Period of 72 hours.
  2. The cost of utilities consumed during the Equipment Performance Period shall be borne by OWNER. The disposal of process related material collected or generated during the Equipment Performance Period shall be by OWNER.
  3. Fuel, lubricants and parts used during the Equipment Performance Period shall be provided by the CONTRACTOR, unless otherwise specified or agreed to in advance.
- B. No system or subsystem shall be started up for continuous operation unless all components of that system or subsystem, including instrumentation, have been tested to the extent practicable as indicated in the applicable equipment specification Sections and proven to be operable as intended by the Contract Documents.
- C. Equipment Performance Period shall be completed separately for Coagulation Basin Nos 1 through 5.
- D. An Equipment Performance Period shall be completed for the following equipment:
1. Coagulation Basins, including Flocculation Basins and Settling Tanks (5 in total)
  2. Potassium Permanganate System
  3. Filter Aid System
  4. Caustic Pumps

**1.2 SUBMITTALS**

- A. Outline of CONTRACTOR's proposed procedure for the Equipment Performance Period.

**PART 2 - PRODUCTS - NOT USED**

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**PART 3 - EXECUTION**

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**3.1 EQUIPMENT PERFORMANCE PERIOD**

- A. The equipment shall operate in continuous service without failure to perform or interruption due to equipment malfunction of any kind for an Equipment Performance Period of 72 hours, as a condition of Substantial Completion. The Equipment Performance Period shall be the overall in-service time. If the equipment fails for any reason during the Equipment Performance Period, or fails to perform in accordance with this specification during the Equipment Performance Period, the Equipment Performance Period shall start from "zero" upon the CONTRACTOR correcting the problem.



- B. For items of equipment which are part of a system, all items of equipment in the system, including items furnished by other contractors, must undergo the Equipment Performance Period simultaneously.
- C. The Equipment Performance Period shall be performed with un-thickened sludge.
- D. The Equipment Performance Period shall consist of three operating days (Tu-Th), during which period the OWNER's operating personnel will observe the CONTRACTOR and the equipment's operation. The CONTRACTOR shall provide properly qualified personnel for three subsequent 8-hour operating days during the Equipment Performance Period. In addition, the CONTRACTOR shall provide the services of a service mechanic/electrician who shall be readily available as required during the entire Equipment Performance Period. The mechanic/electrician shall make minor adjustments to the equipment, if required, establish a regular schedule for lubrication of all equipment, and shall demonstrate the techniques of lubrication.
- E. The CONTRACTOR shall be responsible for all operation and preventive, routine and corrective maintenance of the new equipment during the Equipment Performance Period, including responding to any alarms or failures, 24 hours per day. If the new equipment develops a problem or fails during the Equipment Performance Period, the CONTRACTOR's designated representative will be notified by the CONSULTANT or OWNER's operating personnel, and the CONTRACTOR shall immediately respond, troubleshoot and correct the problem or switch to a backup. If, in the opinion of the OWNER, the CONTRACTOR fails to respond in a timely and effective manner, and if such failure may damage other equipment or the facility or adversely affect the treatment process or effluent quality, the OWNER's personnel may respond and take necessary corrective action. The cost to the OWNER of any such response and action shall be deducted from monies otherwise due the CONTRACTOR. However, the OWNER shall not be obligated to respond, and such response or non-response by the OWNER shall not relieve the CONTRACTOR from liability for damage to the OWNER's property caused by an equipment failure during the Equipment Performance Period, or for making permanent repairs or corrections to the failed equipment. The CONTRACTOR shall not have nor make any claim against the OWNER for actual or alleged damages to the equipment, the facility or the OWNER's property due to the OWNER's response or action or failure to respond or act.
- F. At least 14 days prior to the Equipment Performance Period, the CONTRACTOR shall submit in writing to the CONSULTANT a complete outline of his proposed procedure for the Equipment Performance Period. The Equipment Performance Period shall not begin until approval is given. Such approval shall be for the general schedule and in no way relieves the CONTRACTOR of his responsibility for conducting the Equipment Performance Period in accordance with this Specification and with an adequate number of personnel to handle all emergencies.
- G. Seven days prior to the Equipment Performance Period, a coordination conference shall be held to establish startup procedures, to determine the status of all equipment and generally coordinate all aspects of this phase of the Project. Representatives of the OWNER, CONSULTANT, and CONTRACTOR shall attend the conference. All shop and field tests shall be performed and accepted prior to initiation of the Equipment Performance Period.
- H. When the specified Equipment Performance Period has been successfully completed and accepted by the OWNER, operation of the new equipment or system will be assumed by the OWNER. At that time, the CONSULTANT will provide a Certificate of Partial Utilization. The OWNER will assume full responsibility for operation and maintenance of the equipment and the guarantee period for that equipment will begin.

**END OF SECTION**



## SECTION 02 41 19 SELECTIVE DEMOLITION

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### PART 1 - GENERAL

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#### 1.1 SUMMARY

- A. This Section includes demolition and removal of selected portions of existing structures, electrical, plumbing, mechanical and HVAC systems, and subsequent patching and repairs.

#### 1.2 QUALITY ASSURANCE

- A. Engage an experienced firm that has successfully completed at least five (5) selective demolition works of similar size and scope to that indicated for this Project.
- B. Comply with governing EPA notification regulations before starting selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

#### 1.3 SUBMITTALS

- A. In addition to those submittals identified in the General Conditions, the following items shall also be submitted:
  1. Proposed dust-control measures
  2. Proposed noise-control measures
  3. Schedule of selective demolition activities indicating the following:
    - a. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity
    - b. Interruption of utility services
    - c. Coordination for shutoff, capping, and continuation of utility services
    - d. Detailed sequence of selective demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
    - e. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
    - f. Locations of temporary partitions and means of egress
  4. Closeout Submittals
    - a. Inventory: Submit a list of items that have been removed and salvaged.
    - b. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

#### 1.4 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.



## 1.5 PROJECT CONDITIONS

- A. Owner will occupy portions of the building immediately adjacent to selective demolition area. Conduct selective demolition so that Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- B. Owner assumes no responsibility for actual condition of buildings to be selectively demolished. Notify Engineer and Owner of discrepancies between existing conditions and Contract Drawings before proceeding with selective demolition.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work. If suspected hazardous materials are encountered, do not disturb; immediately notify Engineer and Owner. Hazardous materials will be removed by Owner under a separate contract.

## PART 2 - PRODUCTS

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### 2.1 REPAIR MATERIALS

- A. Use repair materials identical to existing materials.
  - 1. Where identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
  - 2. Use materials whose installed performance equals or surpasses that of existing materials.

## PART 3 - EXECUTION

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### 3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped prior to equipment removal.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Engineer.
- E. Survey the condition of the building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during selective demolition.
- F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

### 3.2 UTILITY SERVICES

- A. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to





governing authorities.

- a. Provide not less than two weeks' notice to Owner if shutdown of service is required during changeover.
- B. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services serving portion of building to be selectively demolished.
1. Owner shall coordinate shut-off of indicated utility services with Owner and utility.
  2. Where utility services are required to be removed, relocated, or abandoned, provide bypass connections to maintain continuity of service to other parts of the building before proceeding with selective demolition.
  3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit after bypassing.

### 3.3 PREPARATION

- A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.
- B. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
  1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.
  1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
  2. Protect walls, ceilings, floors, and other existing finish work that are to remain and are exposed during selective demolition operations.
  3. Cover and protect furniture, furnishings, and equipment that have not been removed.
- D. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
  1. Strengthen or add new supports when required during progress of selective demolition.

### 3.4 POLLUTION CONTROLS

- A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.
  1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  1. Remove debris from elevated portions of building by chute, hoist, or other device that



will convey debris to grade level.

- C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before start of selective demolition.

### 3.5 SELECTIVE DEMOLITION

- A. Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete Work within limitations of governing regulations and as follows:
  1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition work above each floor or tier before disturbing supporting members on lower levels.
  2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
  3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
  5. Maintain adequate ventilation when using cutting torches.
  6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  7. Locate selective demolition equipment throughout the structure and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  8. Dispose of demolished items and materials promptly. On-site storage or sale of removed items is prohibited.
  9. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.
- B. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain, using power-driven masonry saw or hand tools; do not use power-driven impact tools.
- C. Break up and remove concrete slabs on grade, unless otherwise shown to remain.

### 3.6 PATCHING AND REPAIRS

- A. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations.
- B. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
  1. Completely fill holes and depressions in existing masonry walls to remain with an approved masonry patching material, applied according to manufacturer's printed

recommendations.

- C. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction to remain in a manner that eliminates evidence of patching and refinishing.
- D. Patch and repair floor and wall surfaces resulting from electrical, mechanical, HVAC or plumbing demolition. Provide a flush and even surface of uniform color and appearance.
  - 1. Closely match texture and finish of existing adjacent surface.
  - 2. Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
  - 3. Where patching smooth painted surfaces, extend final paint coat over entire unbroken surface containing the patch after the surface has received primer and second coat.
  - 4. Patch and repair masonry walls or partitions.
  - 5. Inspect and test patched areas to demonstrate integrity of the installation, where feasible.
  - 6. Patch and repair concrete floors, foundation walls and tank walls.
- E. Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

### 3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them. Provide landfill ticket/receipt to Engineer and Owner.

### 3.8 CLEANING

- A. Sweep the building room clean on completion of selective demolition operation.
- B. Change filters on air-handling equipment on completion of selective demolition operations.

### 3.9 WIRING REMOVALS

- A. Where wiring is shown, specified or noted for removal, work shall include all conduits, junction boxes, supports, conductors and appurtenances. Where wiring removals include both exposed and concealed conduit in concrete, work shall include removal of exposed conduit flush with concealed conduit. Grout remaining concealed conduit closed.
- B. All wall, floor, ceiling, equipment and panel enclosure openings resulting from wiring or device removal shall be restored to match existing surfaces and finishes.
- C. Where existing circuits are shown to be removed or modified, field verify existing connections and wiring to ensure actual circuits are as shown.
- D. Portions of existing wiring noted to be disconnected and remain shall have conductor ends tapped and tagged to note origin.

END SECTION



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**SECTION 02 82 00  
ASBESTOS ABATEMENT**

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**PART 1 - GENERAL**

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**1.1 SECTION INCLUDES**

- A. Abatement and disposal of asbestos-containing materials (ACM) from areas of scheduled work.

**1.2 SUMMARY**

- A. This Section describes the methods and procedures for abatement of ACM from designated areas of affected buildings and appurtenant facilities prior to scheduled demolition and renovation activities.
- B. Building materials have been determined to be ACM based on previous sampling and analysis. Analytical results for bulk samples collected for this project are available in the following reports.
1. "Limited Hazardous Materials Survey" report for Sturgeon Point Water Treatment Plant, prepared by Atlantic Testing Laboratories, Limited (ATL), and dated December 22, 2015 (reference ATL Report No. RT5261CE-01-12-15)
  2. "Limited Hazardous Materials Survey Addendum 1" report for Sturgeon Point Water Treatment Plant, prepared by Atlantic Testing Laboratories, Limited (ATL), and dated February 18, 2016 (reference ATL Report No. RT5261CE-01-12-15 Addendum 1)
- C. The materials listed below were determined to be ACM, and will require abatement prior to scheduled demolition and renovation activities. Reference the project abatement drawings for locations of scheduled abatement.
1. Sturgeon Point Water Treatment Plant – Filter Building – Back Flow Valves
    - a. Painted Black Mesh TSI Jacket (Drawing No. HM-002)
    - b. White Painted Black End Sealant (Drawing No. HM-002)
  2. Sturgeon Point Water Treatment Plant – Filter Building – Chemical Bulk Storage Tanks
    - a. Black Mesh Tank Wrap - Caustic Soda Tank (Drawing No. HM-003)
    - b. Black Tank Base Gasket - Caustic Soda Tank (Drawing No. HM-003)
  3. Sturgeon Point Water Treatment Plant – Filter Building – Lobby Area
    - a. Fume Hood (Drawing No. HM-001)
  4. Sturgeon Point Water Treatment Plant – Filter Building – Chlorinator Room
    - a. Duct Work (Drawing No. HM-001)
  5. Van de Water Treatment Plant
    - a. Fume Hood (Drawing No. HM-001)
- D. Materials with trace asbestos have been identified within the affected buildings. Although not considered regulated ACM, work activities affecting materials with trace asbestos shall be performed in accordance with applicable requirements of OSHA 29 CFR 1926.1101. Reference reports listed in Subpart 1.02(B) for additional details pertaining to identified materials with trace asbestos.
- E. The asbestos-containing White Wall Expansion Caulk materials scheduled for removal

during this project have been determined to also contain polychlorinated biphenyls (PCB). Accordingly, removal and abatement of these caulk materials are also subject to the specifications in Section 02 84 00.

- F. It is the Contractor's responsibility to verify the quantities of materials to be removed as the basis for the bid. The Drawings depict the areas in which the work will be conducted, and show the general location of identified ACM, as determined from the limited hazardous materials surveys performed for the site.
- G. Suspect ACM that have not been tested must be assumed to contain asbestos, unless proved otherwise through sampling and analysis.
- H. Movable furnishings and equipment, including miscellaneous small items such as tools, stored materials, files, and records, will be removed from the work areas prior to asbestos abatement contract work commencing. The Contractor shall provide temporary power and site access to the Asbestos Project Monitor.
- I. All work shall be performed in such a manner as to minimize the risk of exposure to personnel, to prevent exposure to occupants, and to minimize the risk of release of asbestos or asbestos-containing debris to the environment.
- J. All work shall be performed in strict accordance with the Project Documents and all governing codes, rules, and regulations. The information contained within this specification section will be considered part of the Project Documents. Where conflicts occur between the Project Documents and applicable codes, rules, and regulations, the more stringent procedure(s) shall apply.
- K. The Contractor shall take notice, and make employees aware, of occupational safety hazards associated with the abatement work and other work being performed on-site. The Contractor shall comply with any site-specific safety training that may be required by the Owner.
- L. Performance of the work and preparation and processing of submittals shall be coordinated to comply with the overall project schedule and demolition and construction activities that are scheduled for the site, as specified in other applicable sections of the Project Documents.
- M. Title to Materials: ACM resulting from demolition work, except as otherwise indicated, shall remain the property of the Owner. The Contractor is responsible for disposal, as specified, and maintaining records of disposal.

### 1.3 SUBMITTALS

- A. Submit in accordance with applicable provisions of the contract documents.
- B. Pre-Work Submittals:
  - 1. Contractor license issued by the NYSDOL
  - 2. Progress schedule
    - a. Show the complete sequence of abatement activities and the sequencing of work within each building section
    - b. Show the dates for the beginning and completion of each major element of work, including substantial completion dates for each work area or phase
  - 3. Project Notifications: As required by federal and state regulatory agencies, together with proof of transmittal (i.e., certified mail return receipt)
  - 4. Building Occupant Notification: As required by regulatory agencies
  - 5. Abatement Work Plan: Provide plans that clearly indicate the following information.

- a. Work area/containments numbered sequentially
  - b. Locations and types of all decontamination enclosures
  - c. Entrances and exits to each work area/containments
  - d. Type of abatement activity/technique for each work area/containment
  - e. Number and location of negative air units and exhaust, and calculation verification determining the number of required negative pressure air units
  - f. Proposed location and construction of storage facilities and field office (if applicable)
  - g. Location of water and electrical connections to building services
  - h. Waste transport routes through the building to the waste storage container
  - i. Disposal site/landfill permit from applicable regulatory agency
  - j. NYSDEC Waste Transporter Permit
- C. On-Site Submittals: Refer to Subpart 3.07 for all submittals, documentation, and postings required to be maintained on-site during abatement activities.
- D. Project Close-out Submittals: Within 30 days of project completion, the Contractor shall submit 1 copy of the documents listed below to the Consultant and 1 set of documents shall be forwarded to the Owner.
- 1. **Originals** of all waste disposal manifests, seals, and disposal logs
  - 2. OSHA compliance air monitoring records conducted during the work
  - 3. Daily progress log, including entry/exit log
  - 4. A list of all Workers used in the performance of the project, including name, NYSDOL certification number and expiration date, and NYSDOH 2832 number and expiration date
  - 5. For each Worker used in the performance of the project, submit the Worker's Acknowledgment Statement
  - 6. Disposal site/landfill permit from applicable regulatory agency
  - 7. Final project notifications
- E. The Contractor shall submit a site-specific Health and Safety Plan for review prior to any work activities. The Health and Safety Plan shall include, but not be limited to, Workers' 40-hour OSHA training and 8-hour refresher training certifications and copies of fit test and medical clearance records.

#### 1.4 REFERENCES

- A. The Contractor shall comply with the codes and standards listed below, except where more stringent requirements are shown and/or specified. Specific regulations, standards, and guidance documents are listed for informational purposes due to relevance to the work described herein. Specific regulations, standards, and guidance documents that are not listed may also be applicable to the work.
- 1. Federal Regulations:
    - a. American National Standard Institute (ANSI)
      - 1) ANSI Z88.2-80, Practices for Respiratory Protection
      - 2) ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local

## Exhaust Systems

- b. Code of Federal Regulations (CFR)
    - 1) 29 CFR 1910.1001, "Asbestos" (OSHA)
    - 2) 29 CFR 1910.1200, "Hazard Communication" (OSHA)
    - 3) 29 CFR 1910.134, "Respiratory Protection" (OSHA)
    - 4) 29 CFR 1910.145, "Specification for Accident Prevention Signs and Tags" (OSHA)
    - 5) 29 CFR 1926, "Construction Industry" (OSHA)
    - 6) 29 CFR 1926.1101, "Asbestos" (OSHA)
    - 7) 29 CFR 1926.500, "Guardrails, Handrails and Covers" (OSHA)
    - 8) 40 CFR 61, Subpart A, "General Provisions" (EPA)
    - 9) 40 CFR 61, Subpart M, "National Emission Standard for Asbestos" (USEPA)
    - 10) 49 CFR 171-172, "Transportation Standards" (USDOT)
  - c. Occupational Safety and Health Administration (OSHA)
  - d. United States Department of Transportation (USDOT)
  - e. United States Environmental Protection Agency (USEPA)
    - 1) USEPA 560/585-024, Guidance for Controlling Asbestos-Containing Materials in Buildings (Purple Book)
    - 2) USEPA 530-SW-85-007, Asbestos Waste Management Guidance
2. New York State:
- a. Compilation of the Rules and Regulations of the State of New York (NYCRR)
    - 1) 6 NYCRR, Parts 360 and 364, "Disposal and Transportation" (NYSDEC)
    - 2) 10 NYCRR, Part 73, "Asbestos Safety Program Requirements" (NYSDOH)
    - 3) 12 NYCRR, Part 56, "Asbestos", Industrial Code Rule 56 (NYSDOL)
    - 4) Guidance Document (AGD-v2.0) on 12 NYCRR, Part 56
  - b. New York State Department of Environmental Conservation (NYSDEC)
  - c. New York State Department of Health (NYSDOH)
  - d. New York State Department of Labor (NYSDOL)
  - e. New York State Department of Transportation (NYSDOT)

**1.5 PERMITS AND COMPLIANCE**

- A. The Contractor shall assume full responsibility and liability for compliance with all applicable federal, state, and local laws, rules, and regulations pertaining to work practices, protection of workers, authorized visitors to the site, and persons and property adjacent to the work areas.
- B. The Contractor shall perform asbestos related work in accordance with New York State (NYS) Industrial Code Rule 56, and 29 CFR 1926 as specified herein. Where more stringent requirements are specified, adherence is required to the more stringent requirements.
- C. The Contractor must maintain current licenses pursuant to NYS Department of Labor (NYSDOL), U.S. Environmental Protection Agency (USEPA), and NYS Department of



Environmental Conservation (NYSDEC) for all work related to this project, including the removal, handling, transport, and disposal of ACM.

- D. The Contractor (or qualified subcontractor) shall possess a valid Waste Transporter Permit, issued by the NYSDEC pursuant to 6 NYCRR Part 364, to transport waste material from the site to a storage or disposal facility. The permit shall include the name and location of each storage and/or disposal facility, and a list of all transport vehicles.
- E. The Contractor shall be responsible for all fees related to the asbestos abatement work, including, but not limited to, licenses; permits; project notifications; variance petitions, applications, and re-openings; and Worker certifications.
- F. The Contractor must have, and submit proof upon request, persons employed to engage in or supervise work on the Project that hold a valid NYSDOL asbestos handling certificate pursuant to Industrial Code Rule 56, and valid NYSDOH 2832 form pursuant to 40 CFR, Part 763.
- G. It is the sole responsibility of the Contractor to determine what, if any, patents are applicable to the Project. The Contractor shall pay all royalties and/or license fees. The Contractor shall defend all suits or claims for infringement of any patent rights and hold the Owner and Consultants harmless from loss, including attorney's fees, on account thereof.
- H. The Contractor may, at their own cost, petition applicable regulatory agencies for, obtain, and use site-specific variance(s) to conduct the asbestos abatement work. Should the Contractor choose to apply for any variance, all conditions and provisions of the site-specific variance are subject to the review and approval of the Consultant.
- I. Failure to adhere to the Project Documents shall constitute a breach of the Contract and the Owner shall have the right to, and may, terminate the Contract provided; however, the failure of the Owner to so terminate shall not relieve the Contractor from future compliance.

## 1.6 WORK BY SEPARATE CONTRACT

- A. Project Monitor Contract Work: Services of a qualified Asbestos Abatement Project Monitor will be provided under separate contract. The Asbestos Abatement Project Monitor will be on-site at all times when work is in progress, and will be authorized to observe removal work and interpret and enforce provisions of the Contract Documents.
  - 1. The Asbestos Abatement Contractor shall provide the Asbestos Abatement Project Monitor with access to all areas of work.
  - 2. Services of a certified Asbestos Project Monitor to observe work practices, and conduct visual clearance and air sampling.
  - 3. Services of a laboratory, certified by the NYSDOH Environmental Laboratory Approval Program (ELAP) and the National Institute of Standards and Technology (NIST) National Voluntary Laboratory Accreditation Program (NVLAP), to analyze collected samples.

## 1.7 STOPPAGE OF WORK

- A. The work of the Asbestos Abatement Contractor can be stopped at any time if non-compliance with any applicable regulation, contract requirement, or written job instruction is observed. Standby time required to resolve the situation shall be at the Contractor's expense.
- B. Interpretation of regulations or differences in interpretation of applicable regulations between any parties associated with the project shall be settled in a manner consistent with the administrative and contractual procedures specified in other applicable specifications. If a resolution cannot be readily obtained, the applicable regulatory authority will be

contacted for interpretation. The interpretation of the regulatory authority shall be final.

## **PART 2 - PRODUCTS**

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### **2.1 PROJECT LOG BOOK**

- A. Provide a permanently bound project log book. The log book shall contain, on the title page, the project name; name, address, and telephone number of Owner; name, address, and telephone number of Consultant; name, address, and telephone number of the Contractor; and emergency numbers, including, but not limited to, local Fire/Rescue Department.
- B. All entries into the log shall be made in non-washable, permanent ink, and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted.
- C. All persons entering and exiting the work area shall sign the log and include name, employer, NYSDOL certification number, and time of entrance and exiting.
- D. The Project Supervisor shall document all work performed daily and note all visual assessments required by NYS Industrial Code Rule 56 (e.g., testing and inspection of barriers and enclosure by smoke testing, negative air systems, and manometer readings).

### **2.2 PERSONAL PROTECTIVE EQUIPMENT**

- A. All use of personal protective equipment (PPE) shall be in compliance with applicable OSHA regulations and procedures.
- B. The minimum PPE is Level D Modified (hard hat, safety glasses, and steel-toed boots), at all times at the project site both inside and outside the work areas.
- C. Additional PPE is required to reduce exposure to asbestos. The following PPE shall be used during abatement.
  - 1. Respiratory Protection
    - a. Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.
    - b. Respirators shall be individually fit-tested to personnel under the direction of a competent person on a yearly basis. Fit-tested respirators shall be permanently marked to identify the individual fitted, and use shall be limited to that individual. Fit-test records shall be maintained on-site for each employee.
    - c. The Contractor must provide adequate surveillance of working conditions to ensure the selected respirator provides adequate protection, as defined in 29 CFR 1926.1101. Half-face respirators are the minimum allowable respiratory protection permitted to be utilized during asbestos abatement.
    - 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. A storage area for respirators shall be provided by the Contractor in the clean room side of the personal decontamination enclosure, where the respirators shall be kept in a clean environment.
    - g. The Contractor shall provide and make available a sufficient quantity of respirator filters, so that filter changes can be made as necessary during the work day. Filters

shall be removed and discarded during the decontamination process. Filters cannot be reused. Filters must be changed if breathing becomes difficult.

- h. Filters used with negative pressure air purifying respirators shall not be used any longer than one 8-hour work shift.
  - i. Any authorized visitor, Worker, or Supervisor found in a work area not correctly wearing the required respiratory protection shall be removed from the project site and not be permitted to return.
2. Disposable Protective Clothing
- a. Disposable protective whole body clothing, head coverings, plastic or rubber gloves, and foot coverings shall be provided to personnel utilized during the project. Cloth gloves may be worn inside the plastic or rubber gloves for comfort, but shall not be used alone. Secure sleeves at the wrists, and foot coverings at the ankles, by the use of tape, or provide disposable coverings with elastic wrists or tops.
  - b. Provide sufficient quantities of protective clothing to assure a minimum of 4 complete disposable outfits per day for each individual performing abatement work.
- D. Workers and authorized visitors shall be provided with suitable protective clothing, headgear, eye protection, and footwear whenever they enter the work area.

### 2.3 SIGNS AND LABELS

- A. Provide warning signs and barrier tapes at all approaches to the work area. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the area.
- B. Provide danger signs in vertical format conforming to 29 CFR 1926.1101, minimum size of 20 inches by 14 inches, and displaying the following legend:

DANGER  
CONTAINS ASBESTOS FIBERS  
MAY CAUSE CANCER  
CAUSES DAMAGE TO LUNGS  
DO NOT BREATHE DUST  
AVOID CREATING DUST

- C. Provide 3-inch wide red barrier tape printed with black letters, "DANGER ASBESTOS REMOVAL". Locate barrier tape across all corridors, entrances, and across routes to each asbestos work area. Install tape 3 to 4 feet above finish floor.
- D. Provide asbestos danger labels affixed to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos. Labels shall state the following.

DANGER  
CONTAINS ASBESTOS FIBERS  
AVOID CREATING DUST  
CANCER AND LUNG DISEASE HAZARD

- E. Provide the following asbestos label, of sufficient size to be clearly legible, for display on waste containers (bags or drums) that will be used to transport asbestos contaminated material in accordance with USDOT 49 CFR Parts 171 and 172. Labels shall state the following.

RQ HAZARDOUS SUBSTANCE  
 SOLID, NOS  
 FORM E, NA 9188  
 ASBESTOS

- F. Generator identification information shall be affixed to each waste container, indicating the following and printed in indelible ink.

Generator Name: Sturgeon Point Water Treatment Plant  
 Facility Building Name: (Insert applicable building)  
 Facility Address: 716 Sturgeon Point Road, Derby, New York  
 Date: MM/DD/YYYY

*(For fume hood to be removed at the Van de Water Treatment Plant, substitute applicable information for Generator Name, Facility Building Name, and Facility Address.)*

#### 2.4 POLYETHYLENE SHEETING

- A. Unless otherwise indicated, polyethylene sheeting used on this project shall be at least 6 mil fire retardant sheeting.
- B. Decontamination enclosure systems shall utilize at least 6 mil opaque fire retardant plastic sheeting.

#### 2.5 HEPA VACUUM EQUIPMENT

- A. All vacuuming performed in association with the abatement shall be conducted using 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.

#### 2.6 DISPOSAL BAGS, DRUMS, AND CONTAINERS

- A. Provide 6 mil polyethylene disposal bags printed with asbestos caution labels. Bags shall also be imprinted with USDOT required markings
- 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. Containers and bags must be labeled with the name of the waste generator and the location at which the waste was generated, in accordance with 40 CFR Part 61 NESHAPS.
- D. Containers and bags must be labeled with the date that they are moved from the waste decontamination enclosure to the waste transport container, in accordance with 12 NYCRR, Part 56-8.9(C)(3).
- E. Labeled ACM waste containers or bags shall not be used for non-ACM waste or trash. Any material placed in labeled containers or bags, whether turned inside out or not, shall be handled and disposed of as ACM waste.

#### 2.7 SUFACTANT (AMENDED WATER)

- A. Wet all ACM prior to removal with surfactant mix, and apply in accordance with manufacturer's printed instructions.

**2.8 POWER TOOLS**

- A. Any power tools used to drill, cut into, or otherwise disturb asbestos material shall be manufacturer equipped with HEPA filtered local exhaust ventilation.

**2.9 WATER AND ELECTRICAL**

- A. Water and electrical service shall be coordinated with the Owner prior to initiation of abatement activities. The Contractor shall verify suitability and location of all connections.

**2.10 OTHER PRODUCTS OR MATERIALS**

- A. Other products or materials that are required for use during abatement activities shall comply with local, state, and federal codes and regulations, if applicable. The Contractor is expected to furnish and utilize industry standard equipment and materials. The Contractor shall not furnish equipment or materials that have been altered in such a manner that violates local, state, and/or federal codes and regulations, or presents unnecessary health and safety risks.

**2.11 DELIVERY AND STORAGE**

- A. Deliver all materials to the job site in original packages, with containers bearing manufacturer's name and label.
- B. Store all materials at the job site in a suitable and designated area.
- C. Store materials subject to deterioration or damage away from wet or damp surfaces and under cover.
- D. Protect materials from unintended contamination and theft.
- E. Storage areas shall be kept clean and organized.
- F. Remove damaged or deteriorated materials from the job site. Materials contaminated with asbestos shall be disposed of as asbestos debris as herein specified.

**PART 3 - EXECUTION**

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**3.1 NOTICES**

- A. The Contractor shall provide notification of intent to commence asbestos abatement activities as indicated below.

- 1. At least 10 working days prior to beginning abatement activities, send written notification to:

United States Environmental Protection Agency  
National Emissions Standards for Hazardous Air Pollutants Coordinator  
26 Federal Plaza  
New York, New York 10007

- 2. At least 10 calendar days prior to beginning abatement activities, send written notification to:

New York State Department of Labor  
Division of Safety and Health, Asbestos Control Program  
State Office Campus  
Building 12 – Room 454  
Albany, New York 12240



- B. The Contractor is required to send notifications to regulatory agencies via mail or package delivery service that will provide proof of delivery and receipt.
- C. The Contractor shall post and/or provide Building Occupant Notification at least 10 calendar days prior to beginning abatement activities, as required by New York State Industrial Code Rule 56. The posting shall include the following information.
  - 1. The locations of the abatement project.
  - 2. The amounts and types of ACM being abated.
  - 3. The commencement and completion dates of the project.
  - 4. The name, address, and asbestos license number of the Asbestos Abatement Contractor.
  - 5. The name, address, and license number of the Consultant.
  - 6. The name, address, and NYSDOH ELAP number of the laboratory providing analytical services.

### 3.2 PERSONAL PROTECTIVE EQUIPMENT

- A. The use of respirators must be in compliance with applicable OSHA regulations. Respirators shall be worn until outside of the decontamination room. Refer to Subpart 2.02(C)(1) for applicable respiratory protection PPE.
- B. Disposable protective clothing shall be donned upon entering the decontamination room before entering the work area. Street clothes shall be placed in a storable locker or bin. Workers exiting the work area shall immediately remove protective clothing and place the waste into sealable containers. Refer to Subpart 2.02(C)(2) for applicable disposable protective clothing PPE.

### 3.3 PERSONAL AIR MONITORING

- A. In addition to the requirements of OSHA 1926.1101, the Contractor shall be required to perform personal air monitoring every work shift in each work area during which abatement activities occur, in order to determine that appropriate respiratory protection is being worn and utilized.
- B. The Contractor shall conduct air sampling that is representative of both the 8-hour time weighted average and 30-minute short-term exposures to indicate compliance with the permissible exposure and excursion limits.
- C. Results of personal air monitoring analyses shall be available, verbally, within 24 hours of sampling and shall be posted upon receipt. Written laboratory reports shall be delivered and posted at the work site within 5 days. Failure to comply with these requirements may result in all work being stopped until compliance is achieved.

### 3.4 PROJECT SUPERVISOR

- A. The Contractor shall designate a full-time Project Supervisor, who shall meet the following qualifications.
  - 1. The Project Supervisor must hold a current New York State certification as an Asbestos Contractor Supervisor.
  - 2. The Project Supervisor must meet the requirements of a "Competent Person", as defined by OSHA 1926.1101, and shall have a minimum of 5 years experience as a Supervisor.
  - 3. The Project Supervisor must be able to speak, read, and write English fluently, as well as communicate in the primary language of the Workers.

4. If the Project Supervisor is not on-site at any time whatsoever, all work will be stopped. The Project Supervisor shall remain on-site until the Project is complete. The Project Supervisor cannot be removed from the Project without the written consent of the Owner and the Consultant. The Project Supervisor will be removed from the Project, if so requested, by the Owner.
5. The Project Supervisor shall maintain the Project Log Book in accordance with 12 NYCRR, Part 56-7.3 and the Waste Disposal Log required by Subpart 3.018 of this specification.
6. The Project Supervisor shall be responsible for the performance of the work and shall represent the Contractor in all respects at the Project site. The Supervisor shall be the primary point of contact for the Asbestos Project Monitor.

### 3.5 MEDICAL REQUIREMENTS

- A. Before potential exposure to airborne asbestos fibers, the Contractor shall provide Workers with a comprehensive medical examination, as required by 29 CFR 1910.1001 and 29 CFR 1926.1101.
  1. 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 year.
  2. 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 occupations.
- B. As required by 29 CFR 1910.1001 and 29 CFR 1926.1101, the Contractor shall 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: Assistant Secretary of Labor for Occupational Safety and Health, Director of the National Institute for Occupational Safety and Health (NIOSH), authorized representatives of either of these, and an employee's physician upon the request of the employee or former employee.
- C. The Contractor shall furnish the Owner evidence of its firm's medical surveillance program required under 29 CFR 1910.1001 and 29 CFR 1926.1101.

### 3.6 TRAINING

- A. As required by applicable regulations, prior to assignment to asbestos work, instruct each employee with regard to the hazards of asbestos, safety and health precautions, and the use and requirements of protective clothing and equipment.
- B. Establish a respirator program, as required by ANSI Z88.2, 29 CFR 1910.134 and 29 CFR 1926.1101. Provide respirator training and fit testing.
- C. All Workers and Supervisors shall have successfully completed training and received appropriate certifications, in accordance with NYSDOL and NYSDOH requirements.

### 3.7 ON-SITE DOCUMENTATION

- A. The following submittals, documentation, and postings shall be maintained on-site during abatement activities at a location approved by the Asbestos Project Monitor.
  1. Valid Contractor license issued by the NYSDOL.
  2. Worker certification, training, and medical surveillance records.

- a. Current New York State Asbestos Handler certification cards for each person employed in the removal, handling, or disturbance of asbestos
  - b. Evidence that Workers have received proper training required by the regulations and the medical examinations required by OSHA 29 CFR 1926.1101
  - c. Documentation that Workers have been fit tested specifically for respirators used on the project
  - d. Workers Acknowledgment Statements signed by each employee stating that the employee has received training in the proper handling of ACM; understands the health implications and risks involved; and understands the use and limitations of the respiratory equipment to be used
3. Daily OSHA personal air monitoring results
  4. NYSDOH ELAP certification for the laboratory that will be analyzing the OSHA personal air samples
  5. NYSDEC Waste Transporter Permit
  6. Project documents (specifications and drawings)
  7. Notifications and variances (site-specific) – ensure that the most up-to-date notifications and variances are on-site
  8. Applicable regulations
  9. Material Safety Data Sheets (MSDS) of supplies/chemicals used on the project
  10. Approved Abatement Work Plan
  11. List of emergency telephone numbers
  12. Waste disposal log
  13. Project log book
- B. Medical approval, fit test reports, Worker Acknowledgment Statements, and NYSDOL certificates shall be on-site prior to admittance of any Contractor's employees to the asbestos abatement work area

### 3.8 TEMPORARY UTILITIES

- A. Shut down and lock out all electrical power to the asbestos abatement work area.
- B. Provide temporary 120-240 volt, single phase, three-wire, 100 amp electric service with ground fault circuit interrupters (GFCI) for all electric requirements within the asbestos abatement work area.
  1. Where available, obtain a power supply from the Owner's existing system. Otherwise, provide power from other sources (i.e., generator).
  2. Provide temporary wiring and "weatherproof" receptacles in sufficient quantity and location to serve all HEPA equipment and tools.
  3. Provide wiring and receptacles, as required by the Consultant, for air sampling equipment.
  4. All power to the work area shall be brought in from outside the area through GFCI at the source.
- C. Provide temporary lighting with "weatherproof" fixtures for the work area, including decontamination chambers.
  1. The entire work area shall be kept illuminated at all times.



2. Provide lighting, as required by the Consultant, for performance of required visual assessments.
- D. All temporary devices and wiring used in the work area shall be capable of withstanding decontamination procedures, including HEPA vacuuming and wet wiping.
- E. Utilize domestic water services, if available, from the Owner's existing system. Provide hot water heaters with sufficient capacity to meet project demands.

### 3.9 DECONTAMINATION ENCLOSURES AND WORK AREA PREPARATION

- A. The work area must be vacated by building occupants prior to decontamination enclosure construction and work area preparation.
- B. All demolition necessary to access ACM for removal must be conducted within negative pressure enclosures by licensed asbestos handlers. Demolition debris must be disposed of as asbestos waste.
- C. Provide a personal decontamination enclosure contiguous to each work area. The following conditions shall apply for the construction of a personal decontamination enclosure.
  1. The decontamination enclosure shall be attached to the work area and shall be fully framed and sheathed to prevent unauthorized entry.
  2. For large asbestos projects, access to the work area shall be from the clean room through an airlock to the shower, followed by an airlock to the equipment room to the work area. For small asbestos projects, access to the work area shall be from the clean room, to the shower, and through the equipment room to the work area. Each airlock shall be a minimum of 3 feet from door to door.
  3. The decontamination enclosure ceiling and walls shall be covered with one layer of opaque 6 mil fire retardant polyethylene sheeting. Two layers of reinforced polyethylene sheeting shall be used to cover the floor.
  4. Establish a triple layer of 6 mil polyethylene at the decontamination chamber doorways, weighted to ensure a tight seal of the enclosure. Prior to establishing doorway seals, move all required tools, scaffolding, and equipment into the work area.
  5. The entrance to the clean room shall have a lockable door. The clean room shall be sized to accommodate all full-shift Workers and the Asbestos Project Monitor. The minimum dimensions of the clean room shall be 32 square feet for every 6 full-shift Workers, and 6 feet in height. Provide suitable lockers for storage of Workers' street clothes. Storage for respirators, along with replacement filters and disposable towels, shall also be provided.
  6. Provide a temporary shower, with individual hot and cold water supplies and faucets. Provide a sufficient supply of soap and shampoo. There shall be 1 shower for every 6 full-shift abatement Workers. The shower room shall be constructed in such a way so that travel through the shower chamber shall be through the shower. The shower shall not be able to be bypassed.
  7. Shower water shall be drained, collected, and filtered through a system with at least a 5.0 micron particle size collection capability, containing a series of several filters with progressively smaller pore sizes to avoid rapid clogging of the system. The filtered wastewater shall then be discharged in accordance with applicable codes, and the contaminated filters shall be disposed of as asbestos waste.
  8. The equipment room shall be used for the storage of tools and equipment. A walk-off pan filled with water shall be located in the work area outside the equipment room for workers to clean foot coverings when leaving the work area. A labeled 6 mil plastic ACM

waste bag, for collection of contaminated clothing, shall be located in this room.

9. The personal decontamination enclosure shall be cleaned and disinfected, at a minimum, at the end of each work shift and as otherwise directed by the Asbestos Project Monitor.
- D. Provide a waste decontamination enclosure contiguous to each work area. The following conditions shall apply for the construction of a waste decontamination enclosure.
1. The decontamination enclosure shall be attached to the work area and not located within it. The decontamination enclosure shall be fully framed and sheathed to prevent unauthorized entry.
  2. The waste decontamination enclosure system shall consist of a washroom/cleanup room to the work area and an airlock doorway to the holding area. The airlock shall be a minimum of 3 feet from door to door. The entrance to the holding area shall have a lockable door.
  3. The decontamination enclosure ceiling and walls shall be covered with one layer of opaque 6 mil fire retardant polyethylene sheeting. Two layers of reinforced polyethylene sheeting shall be used to cover the floor.
  4. Establish a triple layer of 6 mil polyethylene at the decontamination chamber doorways, weighted to ensure a tight seal of the enclosure. Prior to establishing doorway seals, move all required tools, scaffolding, and equipment into the work area.
  5. Where there is only one egress from the work area, the holding area of the waste decontamination enclosure system may branch off from the personal decontamination enclosure equipment room, which may then serve as the waste wash room.
- E. The following conditions shall apply to work area preparation procedures.
1. Asbestos danger signs shall be posted at all approaches to the asbestos abatement work area. Post all emergency exit signs only on the work area side at the containment, and post with asbestos caution signs on the non-work area side. Provide all non-work area stairs and corridors accessible to the asbestos abatement work area with warning tapes at the base of stairs and beginning of corridors. Warning tape shall be utilized in addition to caution signs.
  2. Shut down and lock out the building heating, ventilation, and air conditioning (HVAC) and electrical systems. Provide temporary electric power and lighting, as specified in Subpart 3.08.
  3. All surfaces and objects within the work area shall be pre-cleaned using HEPA vacuuming and/or wet wiping methods. Dry sweeping and any other methods that raise dust shall be prohibited. ACM shall not be disturbed during pre-cleaning.
  4. Movable objects within the work area shall be HEPA vacuumed and/or wet wiped and removed from the work area.
  5. All non-movable equipment in the work area shall be completely covered with 2 layers of polyethylene sheeting, at least 6 mil in thickness, and secured in place with duct tape and/or spray adhesive.
  6. Provide enclosure of the asbestos abatement work area necessary to isolate it from unsealed areas of the building, in accordance with the approved Asbestos Abatement Work Plan, and as specified herein.
  7. Seal off all openings, including, but not limited to, windows, diffusers, grills, electrical outlets and boxes, doors, floor drains, and any other penetrations of the work area enclosure, using 2 layers of at least 6 mil fire retardant polyethylene sheeting to form a

critical barrier.

8. Provide temporary framing and sheathing at openings larger than 32 square feet that form the limits of the asbestos abatement work area. Sheathing thickness must be a minimum of 3/8-inch, and all sheathing shall be caulked and the work area side sealed with 2 layers of 6 mil polyethylene sheeting to form an isolation barrier.
9. Sheeting shall be secured with spray adhesive and then sealed with duct tape. All joints in polyethylene sheeting shall overlap a minimum of 12 inches.
10. Frame out emergency exits. Provide double-layered 6 mil polyethylene sheeting and tape seal opening. Post as emergency exits only. Within the work area, mark the locations and directions of emergency exits throughout the work area, using exit signs and/or duct tape.
11. Remove all items attached to, or in contact with, ACM only after the work area enclosure is in place. HEPA vacuum and wet wipe with amended water all removed items prior to removal from the work area and before the start of asbestos removal operations.

### 3.10 WORK AREA ENTRY AND EXIT PROCEDURES

- A. Access to and from the asbestos abatement work area is permitted only through the personal decontamination enclosure, unless otherwise stipulated in a site-specific or applicable variance.
- B. Workers shall sign the entry/exit log upon every entry and exit.
- C. The following procedures shall be followed when entering the work area.
  1. Before entering the work area, Workers shall proceed to the clean room, remove all street clothes, and don protective clothing, equipment, and respirators.
  2. Workers shall proceed from the clean room, through the shower room and the equipment room, and into the work area.
- D. The following procedures shall be followed when exiting the work area.
  1. Before leaving the work area, gross asbestos contamination shall be removed by brushing, wet cleaning, and/or HEPA vacuuming.
  2. In the equipment room, Workers shall remove disposable clothing, but not respirators, and shall place clothing in plastic disposal bags for disposal as contaminated debris prior to entering the shower room.
  3. Workers shall shower thoroughly while wearing respirators, and then wash respirator with soap and water prior to removal.
- E. Upon exiting the shower, Workers shall don new disposable clothing if the work shift is to continue or street clothes to exit the area. Under no circumstances shall Workers enter public, non-work areas in disposable protective clothing.

### 3.11 NEGATIVE AIR PRESSURE FILTRATION SYSTEM

- A. Provide a portable asbestos filtration system that develops a minimum pressure differential of negative 0.02 inches of water column within all full enclosure areas relative to adjacent unsealed areas, and that provides a minimum of 4 air changes per hour in the work area during abatement.
- B. Such filtration systems must be operated 24 hours per day during the entire Project, until the final cleanup is completed and satisfactory results of the final air samples are received from the laboratory.
- C. The system shall include a series of pre-filters and filters to provide HEPA filtration of

particles down to 0.3 microns at 100% efficiency and below 0.3 microns at 99.9% efficiency. Provide sufficient replacement filters to replace pre-filters every 2 hours, secondary pre-filters every 24 hours, and primary HEPA filters every 600 hours of operation.

- D. A minimum of one additional filtration unit of at least the same capacity as the primary unit(s) shall be installed and fully functional to be used during primary unit(s) filter changing and in case of primary failure. There shall be at least one back-up unit for every five primary units.
- E. Upon electric power failure or shut-down of any filtration unit, all abatement activities shall stop immediately and only resume after power is restored and all filtration units are fully operating. For shut-downs longer than one hour, all openings into the work area, including the decontamination enclosures, shall be sealed.
- F. The Contractor shall provide a manometer with a chart recorder to measure and record negative pressure differential across the work area barriers without interruption 24 hours per day for all OSHA class I friable asbestos projects.

### 3.12 REMOVAL OF ASBESTOS-CONTAINING MATERIALS

- A. ACM shall be removed in accordance with the Contract Documents and the approved Asbestos Abatement Work Plan.
- B. Should the area beyond the work area become contaminated with ACM or elevated fiber levels, immediately stop work and institute emergency procedures. Contaminated non-work areas shall be isolated and subsequently decontaminated in accordance with procedures established for asbestos removal. All costs incurred from decontaminating such non-work areas and the contents thereof shall be borne solely by the Contractor, at no additional cost to the Owner.
- C. Perform all asbestos removal work using wet removal procedures. Mix and apply surfactant in accordance with manufacturer's written instructions. Dry removal procedures are not permitted.
- D. Sufficiently wet asbestos materials with a low pressure, airless fine spray of amended water to ensure full penetration prior to ACM removal. Re-wet materials that do not display evidence of saturation.
- E. A sufficient number of Workers shall continuously apply amended water while ACM is being removed. Excess water must be contained within the work area at all times and should be continuously containerized through the use of a HEPA equipped wet/dry vacuum or other adequate methods.
- F. Perform cutting, drilling, abrading, or any penetration or disturbance of ACM 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 power-operated tools used shall be provided with HEPA equipped filtered local exhaust ventilation.
- G. All removed material shall be placed into 6 mil plastic disposal bags or other suitable container upon detachment from the substrate or whenever there is enough accumulation to fill a single bag or container. Maintain work area surfaces free of accumulation of asbestos debris.
- H. Power or pressure washers are not permitted for asbestos removal or clean-up procedures.
- I. All construction and demolition debris determined by the Consultant to be contaminated with asbestos shall be handled and disposed of as asbestos waste.
- J. The use of metal shovels, metal dust pans, etc. are not permitted inside the work area.

### 3.13 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 into the waste decontamination enclosure system airlock by persons assigned to this duty. The work area personnel shall not enter the airlock.
- B. The containers and equipment shall be removed from the airlock by personnel stationed in the wash room during waste removal operations. The external surfaces of containers and equipment shall be cleaned a second time by wet cleaning.
- C. The cleaned containers of asbestos material and equipment are to be dried of any excessive pooled or beaded liquid, placed in uncontaminated plastic bags or sheeting, dependent upon the physical characteristics of the item, and sealed airtight.
- D. The clean re-containerized items shall be moved into the airlock that leads to the holding area. Workers in the wash room shall not enter this airlock or the work area until waste removal is finished for that period.
- E. Containers and equipment shall be moved from the airlock and into the holding area by personnel dressed in clean personal protective equipment, and who have entered from uncontaminated areas.
- F. The cleaned containers of asbestos material and equipment shall be placed in water tight carts with doors or tops that shall be closed and secured. These carts shall be held in the holding area pending removal. The carts shall be wet cleaned and/or HEPA vacuumed at least once each day.
- G. The exit from the decontamination enclosure system shall be secured to prevent unauthorized entry.
- H. Where the waste removal enclosure is part of the personal decontamination enclosure, waste removal shall not occur during shift changes or when otherwise occupied. Precautions shall be taken to prevent short circuiting and cycling of air outward through the shower and clean room.

### 3.14 WORK AREA DECONTAMINATION

- A. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, decontamination procedures shall be performed, as specified in 12 NYCRR 56, Subpart 9.1, unless modified by a site-specific or applicable variance.
- B. The exit from the decontamination enclosure system shall be secured to prevent unauthorized entry.
- C. Where the waste removal enclosure is part of the personnel decontamination enclosure, waste removal shall not occur during shift changes or when otherwise occupied. Precautions shall be taken to prevent short circuiting and cycling of air outward through the shower and clean room.
- D. After isolation and critical barriers are removed, the Consultant shall inspect the work area for cleanliness. If necessary, additional cleaning shall be performed by the Contractor, as directed by the Consultant.
- E. As a result of any unsatisfactory visual assessment by the Consultant, or should final clearance air sampling results indicate high fiber levels, the Contractor shall clean or re-clean the affected areas at no additional expense to the Owner.

**3.15 TENT ENCLOSURES (IF APPLICABLE)**

- A. Tent enclosures may only be used in areas specifically permitted by the NYSDOL Industrial Code Rule 56 or a project site-specific variance issued by the NYSDOL.
- B. The Contractor shall restrict access to the immediate area where tent removal procedures are taking place using barrier tape and/or construction barriers. Caution signs shall be posted.
- C. The Contractor shall not construct or utilize remote personal and waste decontamination enclosure systems. The personal and waste decontamination enclosure systems shall be connected to the work area.
- D. The work area shall be pre-cleaned. All objects and equipment that will remain in the restricted area during abatement shall be sealed with 2 layers of 6 mil polyethylene and tape.
- E. The tent shall be a single-use barrier constructed with a rigid frame and at least 2 layers of 6 mil polyethylene, unless 1 layer of 6 mil polyethylene is otherwise permitted by NYCRR 56 and/or a site-specific variance. All seams shall be sealed airtight using duct tape and/or spray adhesive.
- F. During removals, negative pressure filtration units shall be used to maintain negative air pressure inside the tent.
- G. OSHA compliance air monitoring is required per Subpart 3.03 of this specification section.
- H. ACM removal shall follow procedures defined in Subpart 3.012 of this specification section.
- I. Waste material shall be placed in properly labeled 6 mil plastic bags or other appropriate containers. The outside of the bags or containers shall be wet wiped and/or HEPA vacuumed before being passed into the waste decontamination enclosure system for double-bagging. All transportation of waste bags and containers outside the work area shall be in watertight carts.
- J. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, the decontamination procedures below shall be followed.
  - 1. All bagged asbestos waste and unnecessary equipment shall be decontaminated and removed from the work area.
  - 2. All surfaces in the work area shall be wet cleaned. A wet-purpose shop vacuum may be used to pick up excess liquid, and shall be decontaminated prior to removal from the work area.
  - 3. The Asbestos Project Monitor shall conduct a visual assessment of the work area for cleanliness and completion of abatement.
  - 4. The Contractor shall then apply a thin coat of encapsulant to all surfaces in the work area that were not the subject of removal. In no event shall encapsulant be applied to any surface that was the subject of removal prior to obtaining satisfactory air monitoring results.
  - 5. After the encapsulant has dried, aggressive final clearance air sampling shall then be conducted by the Asbestos Project Monitor.
  - 6. Upon receipt of satisfactory final clearance air sampling results, the tent shall be collapsed into itself, placed in suitable disposal bags, and transported to the waste decontamination enclosure. Isolation and critical barriers shall then be removed.

### 3.16 GLOVEBAG REMOVAL (IF APPLICABLE)

- A. In addition to conformance with applicable regulations and variances, glovebag removals are only permitted to be conducted within tent enclosures complying with these specifications. Removal and disposal must also be conducted in conformance with all regulatory conditions.
- B. The Contractor shall restrict access to the immediate area where tent/glovebag removal procedures are taking place using barrier tape and/or construction barriers. Caution signs shall be posted.
- C. The work area shall be pre-cleaned. All objects and equipment that will remain in the restricted area during abatement shall be sealed with 2 layers of 6 mil polyethylene and tape.
- D. Glovebag removals shall utilize commercially available glovebags of at least 6 mil thickness. Use shall be in accordance with the manufacturer's instructions and the following minimum requirements.
  1. The sides of the glovebag shall be cut to fit the size of pipe being removed. Tools shall be inserted into the attached tool pocket.
  2. The glovebag shall be placed around the pipe and the open edges shall be folded and sealed with staples and duct tape. The glovebag shall also be sealed at the pipe to form a tight seal.
  3. Openings shall be made in the glovebag for the wetting tube and HEPA vacuum hose. The opening shall be sealed to form a tight seal.
  4. All glovebags shall be smoke tested by the Contractor and verified by the Asbestos Project Monitor before removal operations commence. Glovebags that do not pass the smoke test shall be resealed and then retested.
  5. After first wetting the materials to be removed, removal may commence. ACM shall be continuously wetted. After removal of the ACM, the piping shall be scrubbed or brushed, so that no visible ACM remains. Open ends of pipe insulation shall be encapsulated.
  6. After the piping is cleaned, the inside of the glovebag shall be washed down and the wetting tube removed. Using the HEPA vacuum, the glovebag shall be collapsed and then twisted and sealed with the tape with the ACM at the bottom of the bag.
  7. A disposal bag shall be placed around the glovebag that is then detached from the pipe. The disposal bag is then sealed and transported to the decontamination enclosure.

### 3.17 RESTORATION OF FACILITIES

- A. The Contractor shall remove temporary utilities upon completion of abatement activities and notification of compliance with clearance criteria. All temporary power shall be disconnected, power lockouts removed, and power restored. All temporary plumbing shall be removed.

### 3.18 DISPOSAL OF ASBESTOS WASTE

- A. All asbestos waste shall be stored, transported, and disposed of in accordance with the following regulations as a minimum
  1. NYSDEC 6 NYCRR Parts 360 and 364
  2. USEPA NESHAPS 40 CFR 61

3. USEPA Asbestos Waste Management Guidance EPA/530-SW85
- B. The following conditions shall apply for transportation of waste and the selected disposal site.
1. The Contractor's hauler and disposal site shall be pre-approved by the Owner or Owner's designated representative.
  2. The Contractor shall provide 24-hour notification prior to removing any waste from the site. Waste shall be removed from the site only during normal working hours, unless otherwise specified. No waste may be taken from the site, unless the Contractor and Consultant authorizes the release of the waste, as described herein.
  3. The Contractor shall have the hauler provide the estimated date and time of arrival at the disposal site.
  4. Upon arrival at the project site, the hauler must possess and present to the Consultant a valid NYSDEC Part 364 Asbestos Hauler's Permit. The Consultant may verify the authenticity of the hauler's permit with the proper authority.
  5. The hauler, with the Contractor and the Consultant, shall inspect all material in the transport container prior to taking possession and signing the asbestos waste manifests.
  6. Unless specifically approved by the Owner, the Contractor shall not permit any off-site transfers of the waste or allow the waste to be transported or combined with any other off-site asbestos material. The hauler must travel directly to the disposal site, as identified on the notifications, with no unauthorized stops.
- C. The following conditions shall apply to waste storage containers.
1. All waste containers shall be fully enclosed and lockable (i.e. enclosed dumpster, trailer, etc.). No open containers shall be permitted on-site (i.e., open dumpster with canvas cover, etc.), unless specifically permitted by an applicable or site-specific variance.
  2. The Consultant shall verify that the waste storage container and/or truck tags (license plates) match that listed on the NYSDEC Part 364 permit. Any container not listed on the permit shall be removed from the site immediately.
  3. The container shall be plasticized and sealed with a minimum of 2 layers of 6 mil polyethylene on the sides and floor. Once on site, the waste container shall be kept locked at all times, except during load out. The waste container shall not be used for storage of equipment or Contractor supplies.
  4. While on-site, the container shall be labeled with USEPA danger signage in accordance with Subpart 2.03 D of this specification section.
  5. The NYSDEC Asbestos Hauler's Permit number shall be stenciled on both sides and the back of the container.
  6. The container is not permitted to be loaded unless it is properly plasticized, has the appropriate danger signage affixed, and has the permit number appropriately stenciled on the container.
  7. Random checks may be initiated at the disposal site to ensure that procedures outlined herein are complied with.
- D. The following conditions shall apply to the Owner's and hauler's asbestos waste manifests.
1. An asbestos waste manifest shall be utilized in conjunction with the asbestos hauler's manifest.
  2. The hauler's manifest shall be completed by the Contractor and verified by the Consultant that all the information and amounts are accurate and the proper signatures



are in place.

3. The manifests shall have the appropriate signatures of the Contractor and the hauler representatives prior to any waste being removed from the site.
4. Copies of the completed hauler's manifest shall be retained by the Consultant and the Contractor, and shall remain on site for inspection.
5. Upon arrival at the disposal site, the hauler's manifest shall be signed by the disposal facility operator to certify receipt of ACM covered by the manifest.
6. The disposal facility operator shall return the original hauler's manifest and the container seals to the Contractor.
7. The Contractor shall forward copies of the Owner's Hauler's Manifest to the Consultant within 14 calendar days of the waste container being removed from the site. Failure to do so may result in payment being withheld from the Contractor.
8. The Contractor shall utilize waste disposal logs. This log shall be maintained by the Project Supervisor and shall be kept on site at all times.
9. Originals of all waste disposal manifests, seals, and disposal logs shall be submitted by the Contractor to the Owner with the final close-out documentation.

### 3.19 PROJECT MONITORING AND SAMPLING

- A. A Consultant will be retained, under separate contract, to serve as the Abatement Project Monitor and Owner's representative in regard to the performance of the asbestos abatement activities.
- B. The Contractor is required to ensure cooperation with the Consultant, and to comply with direction provided by the Consultant during the course of the project.
- C. The Consultant shall provide the following administrative services.
  1. Review and approve or disapprove submittals, as these pertain to proposed asbestos abatement procedures.
  2. Assure that all notifications to governmental agencies by the Contractor are submitted in a timely manner and are correct in content.
- D. The Consultant shall staff the project with trained and/or certified personnel, designated as the Asbestos Project Monitor, to observe removal work and collect samples.
  1. The Asbestos Project Monitor shall be on-site at all times during which the Contractor is on-site. The Contractor shall not be permitted to conduct any work unless the Asbestos Project Monitor is on-site.
  2. The Asbestos Project Monitor shall observe the Contractor's work practices and procedures for compliance with regulations and project specifications. The Asbestos Project Monitor shall have the authority to direct the actions of the Contractor verbally and in writing to ensure compliance with the project documents and regulations.
  3. The Asbestos Project Monitor shall have the authority to stop work when gross work practice deficiencies or unsafe practices are observed, or when ambient fiber concentrations outside the removal area exceed 0.01 fibers per cubic centimeter or background level, whichever is higher. Such stop work order shall be effective immediately and remain in effect until corrective measures have been taken and the situation has been corrected.
  4. The Asbestos Project Monitor shall provide the following services.
    - a. Observation of the Contractor's work practices and procedures, including

- temporary protection requirements, for compliance with all regulations and project specifications.
- b. Provide abatement project air sampling as required by applicable regulations (NYS DOL) and the Owner. Sampling will include background, work area preparation, abatement, and clearance sampling.
  - c. Verify daily that all Workers used in the performance of the project are certified by the appropriate regulatory agencies.
  - d. Monitor the progress of the Contractor's work, and report any deviations from the schedule to the Owner.
  - e. Monitor, verify, and document all waste load-out operations.
  - f. Verify that the Contractor is performing personal air monitoring daily, and that results are being returned and posted at the site as required.
  - g. The Asbestos Project Monitor shall maintain a log that documents all project-related decisions, actions, activities, and occurrences.
5. The following minimum assessments shall be conducted by the Asbestos Project Monitor. Additional assessments shall be conducted as required by project conditions. Progression from one phase of the work to the next by the Contractor is only permitted with the written approval of the Asbestos Project Monitor.
- a. Pre-Construction Assessment: The purpose of this assessment is to verify the existing conditions of the work area and to document these conditions.
  - b. Pre-Commencement Assessment: The purpose of this assessment is to verify the integrity of each containment system prior to disturbance of any ACM. This assessment shall take place only after the work area is fully prepared.
  - c. Abatement Assessments: The purpose of these assessments is to observe the work practices and procedures and observe the continued integrity of the containment system. Assessments within the removal areas shall be conducted by the Asbestos Project Monitor during preparation, removal, and cleaning activities at least twice every work shift. Additional assessments shall be conducted as warranted.
  - d. Visual Clearance Assessment: The purpose of this assessment is to verify the Contractor's certification that identified materials have been removed from the work area and the absence of all visible accumulations of debris in the work area. This assessment shall be conducted after encapsulation and removal of all surface plastic in the area, except for critical barriers, but before final air clearance testing. This assessment shall be conducted in general accordance with ASTM E 1368 "Standard Practice for Visual Inspection of Asbestos Abatement Projects.
  - e. Post-Clearance Assessment: The purpose of this assessment is to ensure the complete removal of the identified ACM, including debris, from the work area after obtaining satisfactory analytical results for final clearance samples and completing removal of all containment and barrier systems and equipment from the work area.
- E. The Consultant shall provide abatement project air sampling and analysis as required by applicable regulations (NYS DOL). Sampling will include background, work area preparation, abatement, and clearance sampling.
1. Unless otherwise required by applicable regulations, the Consultant shall have samples analyzed by phase contrast microscopy (PCM). Results shall be available within 48 hours after completion of sampling.
  2. For large and small projects, samples shall be collected as required by applicable

regulations (NYS DOL).

3. If the air sampling during abatement reveals airborne fiber levels at or above 0.01 fibers/cc or the background level (whichever is greater) outside the work area, then the Consultant shall issue an immediate stop work order. The Contractor shall then inspect the barriers for leakage and HEPA vacuum and/or wet clean the surface outside the work area. The Contractor shall bear the burden of any and all costs incurred by this delay.
4. Should any clearance sample(s) fail to meet clearance criteria, the Contractor will be directed to re-clean the work area, and new clearance air samples will be collected. The Contractor shall be responsible for any and all costs incurred due to clearance sample failures.
5. The Consultant shall submit copies of all final air clearance results to the NYSDOL at the completion of the project.

**END OF SECTION**

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**SECTION 02 83 00**  
**HANDLING AND REMOVAL OF LEAD-CONTAINING PAINT**

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**PART 1 - GENERAL**

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**1.1 SECTION INCLUDES**

- A. Management and disposal of items with lead-containing paint from areas of scheduled work.

**1.2 SUMMARY**

- A. The project includes demolition and renovation of building materials that are impacted with lead-based paint (LBP) and lead-containing paint. LBP is defined as paint that has a lead content greater than 5,000 parts per million (ppm), and lead-containing paint is defined as paint that contains a detectable concentration of lead. Based on the site usage, work at the subject facility is not subject to the United States Environmental Protection Agency (USEPA) requirements for lead-based paint abatement at "target housing" or a "child-occupied facility."
- B. This section describes the methods and procedures for management of lead-containing paint. Any work where an employee may be occupationally exposed to lead (e.g., disturbance of LBP or lead-containing paint) must comply with the Occupational Safety and Health Administration (OSHA) 29 CFR 1926.62. Disposal of generated wastes that are inclusive of building materials impacted with lead-containing paint must be performed in accordance with applicable USEPA and New York State Department of Environmental Conservation (NYSDEC) regulations.
- C. Surfaces have been determined to have lead-containing paint based on previous sampling and analysis. Analytical results for bulk paint samples collected for this project are available in the following reports.
1. "Limited Hazardous Materials Survey" report for Sturgeon Point Water Treatment Plant, prepared by Atlantic Testing Laboratories, Limited (ATL), and dated December 22, 2015 (reference ATL Report No. RT5261CE-01-12-15)
- D. The materials listed below were determined to be LBP or lead-containing paint, and will require specialized handling and/or disposal methods prior to or during demolition. Reference the report listed in Subpart 1.02(C) and project abatement drawings for locations of referenced paint materials.
1. Filter Building
    - a. Black Paint on Valve Motor Housing
    - b. Light Gray Paint on Large Valve Motor
    - c. Blue Valve Flange
    - d. Red Valve
    - e. Blue Water Line
- E. It is the Contractor's responsibility to verify the locations and quantities of materials to be removed as the basis for the bid.
- F. Painted surfaces that have not been tested must be assumed to contain lead, unless proved otherwise through sampling and analysis.
- G. All work shall be performed in such a manner as to minimize the risk of exposure to personnel, to prevent exposure to occupants and the general public, and to minimize the

risk of release of lead or lead-containing debris to the environment. Heating these materials may produce fumes that are highly toxic to Workers and harmful to the environment. Removal of these materials from the structure may produce dust and chips that must be collected and contained for subsequent management and disposal.

- H. All work shall be performed in strict accordance with the Project Documents and all governing codes, rules, and regulations. The information contained within this specification section will be considered part of the Project Documents. Where conflicts occur between the Project Documents and applicable codes, rules, and regulations, the more stringent procedure(s) shall apply.
- I. The Contractor shall take notice, and make employees aware, of occupational safety hazards associated with lead work and other work being performed on-site. The Contractor shall comply with any site-specific safety training that may be required by the Owner.
- J. Title to Materials: Waste with lead-containing materials resulting from demolition work, except as otherwise indicated, shall remain the property of the Owner. The Contractor is responsible for disposal, as specified, and maintaining records of disposal.

### 1.3 SUBMITTALS

- A. Submit in accordance with the contract documents.
- B. If requested by the Owner or Owner's designated representative, the Contractor shall provide a Work Plan that describes work procedures, cleaning procedures, and procedures for collection and disposal of waste materials to be implemented when working with materials impacted by LBP or lead-containing paint. If a Work Plan is not requested, the absence of such a document does not relieve the Contractor from adherence to applicable local, state, and federal requirements.
- C. If requested by the Owner, the Contractor shall submit a site-specific Health and Safety Plan for review prior to work activities. A Health and Safety Plan shall include, but not be limited to, applicable Workers' training and refresher training certifications and copies of fit test and medical clearance records. If a Health and Safety Plan is not requested, the absence of such a document does not relieve the Contractor from adherence to applicable local, state, and federal requirements.
- D. Project Close-out Submittals: Within 30 days of project completion, the Contractor shall submit the following documents to the Owner:
  - 1. Analytical results for characterizing waste with lead-containing material (i.e., Toxicity Characteristic Leaching Procedure analysis for lead)
  - 2. Originals of waste disposal manifests, as applicable
  - 3. Disposal site/landfill permit, as applicable

### 1.4 REFERENCES

- A. The Contractor shall comply with the codes and standards listed below, except where more stringent requirements are shown and/or specified. Specific regulations, standards, and guidance documents are listed for informational purposes due to relevance to the work described herein. Specific regulations, standards, and guidance documents that are not listed may also be applicable to the work.
  - 1. Federal:
    - a. American National Standard Institute (ANSI)
      - 1) ANSI Z88.2-80, Practices for Respiratory Protection

- b. Code of Federal Regulations (CFR)
    - 1) 29 CFR 1910.1200, "Hazard Communication" (OSHA)
    - 2) 29 CFR 1910.134, "Respiratory Protection" (OSHA)
    - 3) 29 CFR 1926, "Construction Industry" (OSHA)
    - 4) 40 CFR 261, "Identification and Listing of Hazardous Waste" (USEPA)
    - 5) 49 CFR 171-172, "Transportation Standards" (USDOT)
  - c. Occupational Safety and Health Administration (OSHA)
  - d. United States Department of Transportation (USDOT)
  - e. United States Environmental Protection Agency (USEPA)
2. New York State:
- a. Compilation of the Rules and Regulations of the State of New York (NYCRR)
    - 1) 6 NYCRR, Parts 360 and 364, "Disposal and Transportation" (NYSDEC)
  - b. New York State Department of Environmental Conservation (NYSDEC)
  - c. New York State Department of Health (NYSDOH)
  - d. New York State Department of Labor (NYSDOL)
  - e. New York State Department of Transportation (NYSDOT)

## 1.5 PERMITS AND COMPLIANCE

- A. The Contractor shall assume full responsibility and liability for compliance with all applicable federal, state, and local laws, rules, and regulations pertaining to work practices, protection of Workers, authorized visitors to the site, and persons and property adjacent to the work areas.
- B. The Contractor shall provide Workers that are experienced in the performance of lead safe work practices, and trained in accordance with OSHA 29 CFR 1926.62 requirements.
- C. If applicable, the Contractor (or qualified subcontractor) shall possess a valid Waste Transporter Permit, issued by the NYSDEC pursuant to 6 NYCRR Part 364, to transport waste material from the site to a storage or disposal facility. The permit shall include the name and location of each storage and/or disposal facility, and a list of all transport vehicles.
- D. The Contractor shall be responsible for all fees related to work with lead-containing materials and associated waste disposal.

## 1.6 WORK BY SEPARATE CONTRACT

- A. At the option of the Owner, services of a qualified Lead Consultant may be provided under separate contract. The role of the Lead Consultant may include monitoring during work associated with lead-containing materials, collection and analysis of pre- and post-demolition samples, and/or interpretation of the provisions of the Project Documents.

## 1.7 STOPPAGE OF WORK

- A. The work of the Contractor can be stopped at any time if non-compliance with any applicable regulation, contract requirement, or written job instruction is observed.
- B. Interpretation of regulations or differences in interpretation of applicable regulations between any parties associated with the project shall be settled in a manner consistent with

the administrative and contractual procedures specified in other applicable sections of the Project Documents. If a resolution cannot be readily obtained, the applicable regulatory authority will be contacted for interpretation. The interpretation of the regulatory authority shall be final.

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

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## **PART 3 - EXECUTION**

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### **3.1 PERSONAL PROTECTIVE EQUIPMENT**

- A. The use of personal protective equipment (e.g., respirators, disposable protective clothing) must be in compliance with applicable OSHA regulations.

### **3.2 PERSONAL AIR MONITORING**

- A. Personal air monitoring required by the OSHA is the responsibility of the Contractor, not the Owner or Owner's Representative.

### **3.3 WORK AFFECTING LEAD-CONTAINING MATERIALS**

- A. The Contractor shall be responsible for removing, containing, collecting, and disposing of lead-containing materials that are disturbed during the project, in compliance with all applicable federal, state, and local regulations.
- B. Work areas involving the demolition, cutting, modification, or other type of activity that would disturb lead-containing materials and potentially generate lead-containing dust shall be considered a lead hazard as per OSHA 29 CFR 1926.62 for protection of Workers unless the Contractor has removed the potential sources of airborne lead.
- C. Disturbance methods must be performed in a manner that will control lead hazards and limit Worker's exposure to lead hazards. Provisions shall be made to minimize the generation of dust during the demolition and removal operations. Wherever possible, remove existing building components without cutting, heating, abrading, or otherwise significantly disturbing the lead-containing paint.
- D. The Contractor shall utilize work area containment, signage and barriers, lead safe removal and cleaning methods, change areas, showers/wash facilities, employee monitoring, recordkeeping, and other applicable work practices, as necessary to complete the work in compliance with OSHA 29 CFR 1926.62.
- E. The Contractor shall ensure that waste with lead-containing materials are properly handled during each project phase, and packaged and maintained in appropriate containers. Provisions shall be made to prevent lead contamination of the surrounding environment. Waste with lead-containing materials shall be characterized and disposed of as described in Subpart 3.04.

### **3.4 DISPOSAL OF LEAD-CONTAINING PAINT AND RELATED DEBRIS**

- A. Prior to disposal of waste materials that are inclusive of components with LBP, the Contractor shall be responsible for the collection and analysis of a waste characterization sample(s). The sample(s) shall be laboratory analyzed for toxicity in accordance with EPA methods (i.e., Toxicity Characteristic Leaching Procedure (TCLP) lead). Analysis shall be



performed by a NYSDOH Environmental Laboratory Approval Program (ELAP) certified laboratory.

- B. Waste materials with a TCLP lead concentration exceeding the TCLP limit for lead of 5 ppm shall be classified as hazardous waste. The Contractor shall package, transport, and dispose of debris classified as hazardous waste in accordance with all requirements of the agencies listed in Subpart 1.06. The Contractor shall ensure that the time periods for on-site storage of hazardous wastes do not exceed maximum timeframes permitted by federal, state, and local regulations.
- C. For waste that exhibits a TCLP lead concentration of less than 5 ppm, and provided there are no other toxic characteristics that would render the waste hazardous, the Contractor shall package, transport, and dispose of the waste as non-hazardous waste in accordance with all requirements of the agencies listed in Subpart 1.05.
- D. Copies of all applicable waste disposal manifests, seals, and disposal logs shall be submitted by the Contractor to the Owner with the final close-out documentation.

### 3.5 LEAD SAMPLING AND ANALYSIS

- A. At the option of the Owner, a Lead Consultant may be retained, under separate contract, to collect pre- and post-demolition samples for lead analysis. In the event that results for pre-demolition samples are significantly elevated in comparison to the corresponding post-demolition samples, the Contractor shall be required to re-clean the affected area.

END OF SECTION

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**SECTION 09 91 00  
FIELD PAINTING**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. This Section includes Field Painting of all work indicated on the Contract Drawings and specified herein.

**1.2 REFERENCES**

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:
1. American Society for Testing and Materials (ASTM)
    - a. C2246 - Freeze-Thaw Test
    - b. D2247 - Humidity Test
    - c. B117 - Salt Spray Test
    - d. E84 - Surface Burning Characteristics Test
    - e. D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products
    - f. D2805 - Contrast Ratio
    - g. D1308 - Stain Resistance
    - h. D4060 - Abrasion
    - i. D4541 - Adhesion
    - j. D522 - Conical Mandrel Elongation
  2. Steel Structures Painting Council (SSPC)
    - a. Steel Structures Painting Manual, Volume 2, Systems and Specifications

**1.3 QUALITY ASSURANCE**

- A. All materials shall remain in their original containers with manufacturer's label intact. Manufacturer's name, product name and number, and color and batch number, shall appear on the label.
- B. Manufacturer's representative shall be available to advise applicator on proper application techniques and procedures.

**1.4 SUBMITTALS**

- A. In addition to conforming to the requirements described in the General Conditions, submittals shall conform to the following requirements.
1. Manufacturer's descriptive data fully describing each product to include solids by volume and V.O.C. ratings.
  2. Manufacturer's certification that all materials furnished are in compliance with the applicable requirements of the referenced standards and this specification.
  3. Manufacturer's application instructions.

4. Color charts illustrating range of colors available for selection.

## **PART 2 - PRODUCTS**

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### **2.1 MANUFACTURERS**

- A. The following manufacturers are named to establish a standard of quality necessary for the Project:
  1. International Protective Coatings
  2. Themec Company
  3. Or equal

### **2.2 GENERAL**

- A. Coatings shall be applied per manufacturer's recommendations.
- B. All coordination for compatibility between shop primers, shop finish coats, field coats, and possible tie coats, shall be the responsibility of the Contractor.
- C. All field surfaces prepared for field painting will be reviewed by the Engineer before coating application begins.
- D. All coatings specified herein are in addition to shop coatings specified elsewhere.
- E. Apply coatings with a brush or a roller. Spray paint only where scheduled or with Engineer's review.
- F. Clean damaged shop coatings and retouch before any successive field painting is performed.

### **2.3 EXTRA STOCK**

- A. One gallon of unopened paint, in each type and color specified, shall be furnished to the Owner. Multi-component paints shall be supplied as a complete kit.

## **PART 3 - EXECUTION**

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### **3.1 PRE-APPLICATION**

- A. Examine surfaces to be coated and report any conditions that would adversely affect the appearance or performance of the coating systems, and which cannot be put into an acceptable condition by the preparatory work specified.
- B. Contractor shall insure that moisture content of surfaces is within manufacturer's recommendations.

### **3.2 SURFACE PREPARATION**

- A. General
  1. Remove dust and loose material by dusting, sweeping, vacuuming, or blowing with high-pressure air.
  2. Remove oil, wax, and grease in accordance with the manufacturer's recommendations.
  3. Verify with Engineer that all surfaces to be coated are dry, clean, and free from dirt, dust, wax, grease, or other contaminants.
  4. Remove electrical plates, hardware, light fixtures, trim, and fittings prior to preparing



surfaces.

5. Shellac and/or seal marks which may bleed through surface finishes that could not be removed.

#### B. Metals

1. Prepare all non-primed metal surfaces in accordance with the Steel Structures Painting Manual.
  - a. Sandblasting shall conform to the Steel Structures Painting Council Surface Preparations Specifications for commercial blast cleaning (SSPC-SP 6).
  - b. Before blast cleaning begins, the Contractor shall prepare a sample which shall correspond to the photographic standards of SSPC.
  - c. Proportions of sand, grit, or shot shall be adjusted as necessary to produce a prepared surface equivalent to the reviewed sample.
  - d. Applications of protective coatings shall be within 8 hours after blast cleaning.
  - e. Surfaces showing any traces of rust shall be blasted again before application of protective coatings.
  - f. In areas where assemblies are to receive a sandblasted surface preparation, and portions of the assembly have been previously coated, all prior coatings shall be removed by blast cleaning to the extent necessary for proper adhesion of the specified coating.
2. Shop Primed Metals or Ferrous Metals
  - a. SSPC-SP3-Power Tool Clean field connections, welds, burned, and abraded areas to remove rust and contaminants; touch up with specified primer. Feather edges to make patches inconspicuous where exposed to view.
3. Ferrous Metal - Submerged Service
  - a. SSPC-SP10 - Near White Blast Clean
4. Ferrous Metal - Non-Submerged Service
  - a. SSPC-SP6 - Commercial Blast Clean
5. Non-Ferrous Metal
  - a. SSPC-SP1 - Solvent Cleaning
6. Galvanized Metal
  - a. SSPC-SP1 - Solvent Cleaning.
  - b. SSPC-SP7 - Brush-Off Blast Cleaning: care shall be taken not to damage or remove galvanized: provide a uniform 1-mil profile.

#### C. Concrete and Masonry

1. Allow new concrete and masonry to cure 28 days.
2. Patch holes and cracks in the concrete flush with the surface using a Portland cement grout patching material or equivalent.
3. Clean mortar joints
4. Remove stains caused by weathering or corroding metals by cleaning with manufacturer's approved methods.
5. Verify required acid/alkali balance and allowable moisture content of material.
6. Brush off Blast Cleaning: The surface shall be lightly abraded without entirely removing the surface or exposing the underlying aggregates. The cleaned surface



shall have the uniform texture of 100 grit medium sand paper.

- 7. For concrete floors: Whip blast, or mechanical shot blast in accordance with paint manufacturers recommended procedures.

D. Impervious Surfaces

- 1. Remove mildew and mold in accordance with the manufacturer's recommendation.

**3.3 APPLICATION**

- A. Mix and thin material in accordance with the manufacturers printed instructions.
- B. Allow each coat to dry thoroughly before recoating.
- C. Vary color slightly to indicate each successive coating.
- D. Cut in edges clean and sharp where work joins other materials or colors.
- E. Make finish coats smooth, uniform in color, and free of brush marks, laps, runs, dry spray, overspray, and missed areas.

**3.4 UNCOATED MATERIALS AND ITEMS**

- A. Glazed wall finishes, special coatings, and floor finishes are specified elsewhere.
- B. Surfaces not requiring protective coatings:
  - 1. Brass, Aluminum, PVC, Bronze, Copper

**3.5 SCHEDULE FOR PAINTING AND FINISHING**

- A. Actual film thickness will depend on porosity of surface.
- B. Dry Film Thickness (D.F.T.).
- C. Steel-Structural, Tanks, Pipes and Equipment
  - 1. Interior, Non-Immersion

<u>International</u>	D.F.T. (2)
Surface Preparation: SSPC-SP6	
1st Coat: Interseal 670HS	3.0 - 5.0
2nd Coat: Interseal 670HS	<u>4.0 - 6.0</u> 7.0 - 11.0

<u>Tnemec</u>	D.F.T. (3)
Surface Preparation: SSPC-SP6	
1st Coat: N69 Hi-Build Epoxoline II	3.0 - 5.0
2nd Coat: N69 Hi-Build Epoxoline II	<u>4.0 - 6.0</u> 7.0 - 11.0

- 2. Immersion, Potable Water

<u>International</u>	D.F.T. (3)
Surface Preparation: SSPC-SP10	
1st Coat: Interline 850	5.0 - 6.0
2nd Coat: Interline 850	<u>5.0 - 6.0</u>



10.0 -12.0

Tnemec

D.F.T. (3)

Surface Preparation: SSPC-SP10  
 Roughen the surface before topcoating if the N140 has  
 been exposed exterior for 14 days or longer

1st Coat: N140 Pota-Pox Plus  
 2nd Coat: N140 Pota-Pox Plus

6.0 - 8.0  
6.0 - 8.0  
 12.0 -16.0

## D. Concrete

## 1. Interior, Wet Location

International

D.F.T. (3)

Surface Preparation: clean and dry  
 1st Coat: Intergard 345  
 2nd Coat: Intergard 345

4.0 - 6.0  
4.0 - 6.0  
 8.0 -12.0

Tnemec

D.F.T. (3)

Surface Preparation: Clean and dry  
 1st Coat: N69 Hi-Build Epoxoline II  
 2nd Coat: N69 Hi-Build Epoxoline II

4.0 - 6.0  
 4.0 - 6.0  
 8.0 -12.0

## E. Concrete Block and Porous Masonry

## 1. Interior, Wet Location

International

D.F.T. (3)

Surface Preparation: clean and dry  
 1st Coat: Interlac 895  
 2nd Coat: Intergard 475HS  
 3rd Coat: Intergard 475HS

-  
 4.0 - 6.0  
 4.0 - 6.0  
 8.0 -12.0

Tnemec

D.F.T. (3)

Surface Preparation: Clean and dry  
 1st Coat: 130 Envirofill  
 2nd Coat: N69 Hi-Build Epoxoline II  
 3rd Coat: N69 Hi-Build Epoxoline II

100 sq. ft. per gal.  
 4.0 - 6.0  
4.0 - 6.0  
 8.0 -12.0  
 (over filler)

## F. Insulated Pipe

## 1. Refer to Section entitled "Process Pipe Insulation" for coating system requirements.



- G. Ferrous piping, valves, operators, misc. appurtenances installed within the pipeline.  
All of the following systems are for the coating of the exterior of pipe, valves, etc. only.

1. Interior, Non-Immersion

International

D.F.T. (3)

Surface Preparation: SSPC-SP6

1st Coat: Interseal 670HS

3.0 - 5.0

2nd Coat: Intergard 475HS

4.0 - 6.0

7.0 - 11.0

Tnemec

D.F.T. (3)

Surface Preparation: SSPC-SP6

1st Coat: N69 Hi-Build Epoxoline II

3.0 - 5.0

2nd Coat: N69 Hi-Build Epoxoline II

4.0 - 6.0

7.0 - 11.0

2. Exterior, Non-Immersion and Interior Wet Location

International

D.F.T. (3)

Surface Preparation: SSPC-SP6

1st Coat: Interseal 670HS

3.0 - 5.0

2nd Coat: Intergard 475HS

4.0 - 6.0

3rd Coat: Interthane 870HS

3.0 - 4.0

10.0 - 15.0

Tnemec

D.F.T. (3)

Surface Preparation: SSPC-SP6

1st Coat: N69 Hi-Build Epoxoline II

3.0 - 5.0

2nd Coat: N69 Hi-Build Epoxoline II

4.0 - 6.0

3rd Coat: 1074/1075 - Color EnduraShield

2.0 - 3.0

9.0 - 14.0

- H. Galvanized, Non-Ferrous, Wrought piping, valves, operators, misc. appurtenances installed within the pipeline. All of the following systems are for the coating of the exterior of pipe, valves, etc. only.

1. Exterior, Non-Immersion and Interior Wet Location



International

D.F.T. (3)

Surface Preparation: SSPC-SP1 and SSPC SP7

1st Coat: Interseal 670HS

4.0 - 6.0

2nd Coat: Interthane 870HS

3.0 - 4.0

7.0 -10.0

Tnemec

D.F.T. (3)

Surface Preparation: SSPC-SP1 and SSPC SP7

1st Coat: N69 Hi-Build Epoxoline II

4.0 - 6.0

2nd Coat: N69 Hi-Build Epoxoline II

4.0 - 6.0

8.0 - 12.0

## 2. Exterior, Below Grade

International

D.F.T. (3)

Surface Preparation: Clean and Dry

1st Coat: Intertuf 16

16.0 -20.0

16.0 -20.0

Tnemec

D.F.T. (3)

Surface Preparation: Clean and Dry

1st Coat: N69 Hi-Build Epoxoline II

3.0 - 5.0

2nd Coat: 46H-413 Hi-Build Tneme-Tar

16.0 - 20.0

16.0 -20.0

## 3. Interior, Non-Immersion - Average Performance

International

D.F.T. (3)

Surface Preparation: SSPC-SP6

1st Coat: Interseal 670HS

3.0 - 5.0

2nd Coat: Intergard 475HS

4.0 - 6.0

7.0 -11.0

Tnemec

D.F.T. (3)

Surface Preparation: SSPC-SP6

1st Coat: N69 Hi-Build Epoxoline II

3.0 - 5.0

2nd Coat: N69 Hi-Build Epoxoline II

4.0 - 6.0  
7.0 - 11.0

### 3.6 COLOR CODED AND MARKED PIPING

- A. All exposed piping shall be painted, color coded, and marked as scheduled.
1. Piping in exposed trenches shall be considered exposed.
  2. Markers shall be of an all temperature adhesive tape, suitable for any pipe finish or covering.
  3. Printing on markers shall be of sufficient size and style as reviewed by Engineer.
  4. A flow arrow shall be installed with each pipe marker at a minimum spacing of 10 ft.
  5. Where two colors do not have sufficient contrast to easily differentiate between them, a six-inch band of contrasting color shall be on one of the pipes at 30 inch intervals.
- B. On fiberglass, plastic, stainless steel, copper pipe, or other uncoated piping, a combination of wide banding tape and narrow banding tape shall be used for the pipe color and band.

### 3.7 PIPING COLOR CODE

#### A. Water Lines

Raw	Olive Green
Filtered	Aqua
Finished or Potable (Backwash Supply)	Dark Blue

#### B. Chemical Lines

Chlorine (Gas and Solution)	Yellow
Fluoride	Light Blue with Red Band
Potassium Permanganate	Violet

#### C. Waste Lines

Backwash Waste	Light Brown
Sewer (Sanitary or Other)	Dark Gray

#### D. Other

Other Lines	Light Gray
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**END OF SECTION**



**SECTION 22 05 00****BASIC PLUMBING REQUIREMENTS**

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**PART 1 - GENERAL**

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**1.1 WORK INCLUDED**

- A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work, complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these contract documents. All materials and equipment shall be installed in accordance with the manufacturer's recommendations.

**1.2 LICENSING**

- A. The Contractor shall hold a license to perform the work as issued by the authority having jurisdiction.
- B. Plumbing contract work shall be performed by, or under, the direct supervision of a licensed master plumber.
- C. Electrical contract work shall be performed by, or under, the direct supervision of a licensed electrician.

**1.3 PERMITS**

- A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges. Provide certificate of approval from the Authority having jurisdiction prior to request for final payment.
- B. Provide electrical inspection certificate of approval from Middle Department Inspection Agency, Commonwealth Inspection Agency, or an Engineer approved Inspection Agency prior to request for final payment.

**1.4 CODE COMPLIANCE**

- A. Provide work in compliance with the following:
1. Building Code of New York State.
  2. Mechanical Code of New York State.
  3. Plumbing Code of New York State.
  4. Fire Code of New York State.
  5. Energy Conservation Construction Code of New York State.
  6. New York State Department of Labor Rules and Regulations.
  7. New York State Department of Health.
  8. National Electrical Code (NEC).

9. Occupational Safety and Health Administration (OSHA).
10. Local Codes and Ordinances.
11. Life Safety Codes, NFPA 101.
12. Town of Evans Plumbing Department.

## 1.5 GLOSSARY

ACI	American Concrete Institute
AGA	American Gas Association
AGCA	Associated General Contractors of America, Inc.
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AFBMA	Anti-Friction Bearing Manufacturer's Association
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASTM	American Society for Testing Materials
AWSC	American Welding Society Code
AWWA	American Water Works Association
FM	Factory Mutual Insurance Company
IBR	Institute of Boiler & Radiation Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NYS/DEC	New York State Department of Environmental Conservation
SBI	Steel Boiler Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UFPO	Underground Facilities Protective Organization
UL	Underwriter's Laboratories, Inc.

OSHA Occupational Safety and Health Administration  
 XL - GAP XL Global Asset Protection Services

## 1.6 DEFINITIONS

Acceptance	Owner acceptance of the project from Contractor upon certification by Engineer.
As Specified	Materials, equipment including the execution specified/shown in the contract documents.
Basis of Design	Equipment, materials, installation, etc. on which the design is based. (Refer to the article, Equipment Arrangements, and the article, Substitutions.)
Code Requirements	Minimum requirements.
Concealed	Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
Coordination Drawings	Show the relationship and integration of different construction elements and trades that require careful coordination during fabrication or installation, to fit in the space provided or to function as intended.
Delegated-Design Services	(Performance and Design criteria for Contractor provided professional services). Where professional design services or certifications by a design professional are specifically required of a Contractor, by the Contract Documents. Provide products and systems with the specific design criteria indicated.  If criteria indicated is insufficient to perform services or certification required, submit a written request for additional information to the Engineer.  Submit wet signed and sealed certification by the responsible design professional for each product and system specifically assigned to the Contractor to be designed or certified by a design professional.  Examples: structural maintenance ladders, stairs and platforms, pipe anchors, seismic compliant system, wind, structural supports for material equipment, sprinkler hydraulic calculations.
Equal, Equivalent, Equal To, Equivalent To, As Directed and As Required	Shall all be interpreted and should be taken to mean "to the satisfaction of the Engineer".
Exposed	Work not identified as concealed.
Extract	Carefully dismantle and store where directed by Engineer and/or reinstall as indicated on drawings or as described in specifications.
Furnish	Purchase and deliver to job site, location as directed by the Engineer.
Inspection	Visual observations by Engineer.

Install	Store at job site if required, proper placement within building construction including miscellaneous items needed to affect placement as required and protect during construction. Take responsibility to mount, connect, start-up and make fully functional.
Labeled	Refers to classification by a standards agency.
Manufacturers	Refer to the article, Equipment Arrangements, and the article, Substitutions.
Prime Professional	Engineer having a contract directly with the Owner for professional services.
Product Data	Illustrations, standard schedules, performance charts, instructions, brochures, wiring diagrams, finishes, or other information furnished by the Contractor to illustrate materials or equipment for some portion of the work.
Provide (Furnish and Install)	Contractor shall furnish all labor, materials, equipment and supplies necessary to install and place in operating condition, unless otherwise specifically stated.
Relocate	Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.
Remove	Dismantle and take away from premises without added cost to Owner, and dispose of in a legal manner.
Review and Reviewed	Should be taken to mean to be followed by "for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents".
Roughing	Pipe, duct, conduit, equipment layout and installation.
Samples	Physical full scale examples which illustrate materials, finishes, coatings, equipment or workmanship, and establishes standards by which work will be judged.
Satisfactory	As specified in contract documents.
Shop Drawings	Fabrication drawings, diagrams, schedules and other instruments, specifically prepared for the work by the Contractor or a Sub-contractor, manufacturer, supplier or distributor to illustrate some portion of the work.
Site Representative	Engineer at the work site.
Submittals Defined (Technical)	Any item required to be delivered to the Engineer for review as requirement of the Contract Documents.  The purpose of technical submittals is to demonstrate for those portions of the work for which a submittal is required, the manner in which the Contractor proposes to conform to the information given and design concepts expressed and required by the Contract Documents.

**1.7 SHOP DRAWINGS/PRODUCT DATA/SAMPLES**

- A. Refer to Section 013300 - Shop Drawing Procedures for requirements.

**1.8 PROTECTION OF PERSONS AND PROPERTY**

- A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

**1.9 EQUIPMENT ARRANGEMENTS**

- A. The contract documents are prepared using one manufacturer as the Basis of Design, even though other manufacturers' names are listed. If Contractor elects to use one of the listed manufacturers other than Basis of Design, submit detailed drawings, indicating proposed installation of equipment. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in the work of other trades, at no cost to the Owner. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace doorframes, access doors, walls, ceilings, or floors required to install other than Basis of Design. If revised arrangement submittal is rejected, revise and resubmit specified Basis of Design item which conforms to Contract Documents.

**1.10 SUBSTITUTIONS**

- A. See Section 012500 - Substitution Procedures for requirements.

**1.11 CONTINUITY OF SERVICES**

- A. The building will be in use during construction operations. Maintain existing systems in operation within all rooms of building at all times. Refer to "General Conditions of the Contract for Construction" for temporary facilities for additional contract requirements. Schedules for various phases of contract work shall be coordinated with all other trades and with Owner's Representative. Provide, as part of contract, temporary mechanical and electrical connections and relocations as required to accomplish the above. Obtain approval in writing as to date, time, and location for shutdown of existing mechanical/electrical facilities or services.
- B. Refer to Section 013113 - Coordination with Owner's Operations for additional requirements.

**1.12 ROUGHING**

- A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.

- B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of the contract to accommodate obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. **DO NOT SCALE** plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Engineer for review. Obtain written approval for all major changes before installing.
- C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.
- D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Engineer exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, and other items.
- E. Before roughing for equipment furnished by Owner or in other contracts, obtain from Owner and other Contractors, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:
  1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.
  2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Engineer.

### 1.13 REMOVAL WORK

- A. Where existing equipment removals are called for, submit complete list to Engineer. All items that Owner wishes to retain that do not contain asbestos or PCB Material shall be delivered to location directed by Owner. Items that Owner does not wish to retain shall be removed from site and legally disposed of. Removal and disposal of material containing asbestos, lead paint, mercury and PCB's shall be in accordance with Federal, State and Local law requirements. Where equipment is called for to be relocated, contractor shall carefully remove, clean and recondition, then reinstall. Remove all abandoned piping, wiring, equipment, lighting, ductwork, tubing, supports, fixtures, etc. Visit each room, crawl spaces, and roofs to determine total Scope of Work. The disturbance or dislocation of asbestos-containing materials causes asbestos fibers to be released into the building's atmosphere, thereby



creating a health hazard to workmen and building occupants. Consistent with Industrial Code Rule 56 and the content of recognized asbestos-control work, the Contractor shall apprise all of his workers, supervisory personnel, subcontractors, Owner and Engineer who will be at the job site of the seriousness of the hazard and of proper safeguards and work procedures which must be followed, as described in New York State Department of Labor Industrial Code Rule 56.

- B. For materials indicated to contain lead, that are being affected by demolition or construction, the contractor shall be in accordance with all Federal, State and Local law requirements regarding worker exposure to lead disturbance and abatement procedures.
- C. Refer to the Owner's Lead Paint Survey. The Survey identifies the surfaces within the buildings that were tested for lead by collecting paint samples and performing laboratory analysis. If any unidentified surfaces are to be impacted the lead content shall be tested by analytical determinations conducted by a qualified laboratory approved by the Owner. The contractor shall review the current owner's lead paint reports on file before starting any work which may disturb existing surfaces.

#### 1.14 REFRIGERANT RECOVERY

- A. Existing equipment to be removed, as shown on the plans may contain refrigerant and refrigerant oils. This refrigerant and refrigerant oil must be handled in accordance with Federal, State and Local law requirements.
- B. Removal and recovery of refrigerant shall be in accordance with the current edition of Section 608 of the Clean Air Act of 1990, including all final regulations.
- C. Refrigerant recovery must be performed by a technician, certified by an EPA-approved certification program, using refrigerant recovery and recycling equipment certified by an EPA-approved testing organization.
- D. Owner "reserves the right of first refusal" on ownership of recovered refrigerant. Should Owner choose to maintain ownership of refrigerant, refrigerant shall be reclaimed, cleaned by this Contractor to ARI 700-1993 Standard of Purity, by an EPA certified refrigerant reclaimer. Refrigerant shall be turned over to the Owner in suitable marked containers to be stored on site, at a place of the Owner's choosing.

#### 1.15 EQUIPMENT AND MATERIAL INSTALLATION

- A. Provide materials that meet the following minimum requirements:
  1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
  2. All equipment and material for which there is a listing service shall bear a UL label.
  3. Potable water systems and equipment shall be built according to AWWA and NSF Standards.
  4. Electrical equipment and systems shall meet UL Standards and requirements of the NEC.

- B. Exterior and wet locations shall utilize materials, equipment supports, mounting, etc. suitable for the intended locations. Metals shall be stainless steel, galvanized or with baked enamel finish as a minimum. Finishes and coatings shall be continuous and any surface damaged or cut ends shall be field corrected in accordance with the manufacturer's recommendations. Hardware (screws, bolts, nuts, washers, supports, fasteners, etc.) shall be:
1. Stainless steel where the associated system or equipment material is stainless steel or aluminum.
  2. Hot dipped galvanized or stainless steel where the associated system or equipment is steel, galvanized steel or other.

### 1.16 CUTTING AND PATCHING

- A. Each trade shall include their required cutting and patching work unless otherwise shown. Refer to General Conditions for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch cut or abandoned holes left by removals of equipment or fixtures. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

### 1.17 PAINTING

- A. Paint all insulated and bare piping, pipe hangers and supports exposed to view in mechanical equipment rooms, penthouse, boiler rooms and similar spaces. Paint all bare piping, ductwork and supports exposed to the out-of-doors. Paint all equipment that is not factory finish painted (i.e. expansion tanks, etc.).
- B. All painting shall be in accordance with Section 099100 - Field Painting. All surfaces must be thoroughly cleaned before painting. Review system color coding prior to painting with the Engineer or Architect.
- C. All items installed after finished painting is completed and any damaged factory finish paint on equipment furnished under this contract must be touched up by the Contractor responsible for same.
- D. Include painting for patchwork with color to match adjacent surfaces. Where color cannot be adequately matched, paint entire surface.
- E. All primers and paint used in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.
- F. Color coding of piping shall comply with the Ten States Standards.

### 1.18 EXISTING CEILING REMOVAL AND RE-INSTALLATION

- A. In a renovation project, any existing ceiling removal and re-installation work required for the completion of a Contractors or Subcontractors work, shall be removed and re-installed by that Contractor or Subcontractor. This applies in any areas not called for to have a new ceiling installed.
- B. The ceiling removal and re-installation shall include lay-in ceiling tile and grid, to the extent necessary to accomplish the work. Removed ceiling tile and grid shall be safely stored during the course of the work, and it shall be re-installed to the original existing condition.
- C. The ceiling removal and re-installation shall include gypsum board or plaster ceilings and the associated suspension systems. Removed ceiling areas shall be patched with materials to match the existing ceiling, and painted to match. If paint cannot be matched exactly, paint the entire ceiling a similar color.

### 1.19 CONCEALMENT

- A. Conceal all contract work above ceilings and in walls, below slabs, and elsewhere in finished areas of the buildings. If concealment is impossible or impractical, notify Engineer before starting that part of the work and install only after his review. In areas with no ceilings, install only after Engineer reviews and comments on arrangement and appearance.

### 1.20 CHASES

- A. In Existing Buildings:
  - 1. Drill holes for floor and/or roof slab openings.
  - 2. Multiple pipes smaller than 1 in. properly spaced and supported may pass through one 6 in. or smaller diameter opening.
  - 3. Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge galvanized sleeves at fire rated assemblies. Extend sleeves 2 in. above floors.
  - 4. In wall openings, drill or cut holes to suit. Provide 18 gauge galvanized sleeves at shafts and fire rated assemblies. Provide fire-stopping seal between sleeves and wall in drywall construction. Provide fire stopping similar to that for floor openings.

### 1.21 PENETRATION FIRESTOPPING

- A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:
  - 1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.

2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.
6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.
7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.

**B. Acceptable Manufacturers:**

1. Dow Corning Fire-Stop System Foams and Sealants.
2. Nelson Electric Fire-Stop System Putty, CLK and WRP.
3. S-100 FS500/600, Thomas & Betts.
4. Carborundum Fyre Putty.
5. 3-M Fire Products.
6. Hilti Corporation.

### 1.22 NON-RATED WALL PENETRATIONS

- A. Each trade shall be responsible for sealing wall penetrations related to their installed work, including but not limited to ductwork, piping, conduits, etc. See individual specification sections for requirements.

### 1.23 SUPPORTS

- A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. For precast panels/planks and metal decks, support mechanical/electrical work as determined by manufacturer and the Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.
- B. Equipment, piping, conduit, raceway, etc. supports shall be installed to minimize the generation and transmission of vibration.
- C. Materials and equipment shall be solely supported by the building structure and connected framing.

**1.24 HVAC EQUIPMENT CONNECTIONS**

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Provide final hot water, drain and vent connections to all equipment as required by the equipment. Provide final connections, including domestic water piping, wiring, controls, and devices from equipment to outlets left by other trades. Provide equipment waste, drip, overflow and drain connections extended to floor drains.
- C. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, insulation, sheet metal work, controls, dampers, as required.
- D. Refer to manufacturer drawings and specifications for requirements of special equipment. Verify connection requirements before bidding.

**1.25 PLUMBING EQUIPMENT CONNECTIONS**

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Provide roughing and final water and indirect waste connections to all equipment. Provide loose key stops, adapters, and all necessary piping and fittings from roughing point to equipment. Provide installation of equipment furnished by others. Provide cold water line with gate valve and backflow prevention device at locations called for. Provide continuation of piping and connection to equipment that is furnished by others. Provide relief valve discharge piping from equipment relief valves.
- C. Provide valved water outlet adjacent to equipment requiring same. Provide equipment type floor drains, or drain hubs, adjacent to equipment.
- D. Install controls and devices furnished by others.
- E. Refer to Contract Documents for roughing schedules, and equipment and lists indicating scope of connections required.
- F. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, pressure reducing valves, gauges, relief valves, vents, drains, as required.
- G. Refer to Manufacturer drawings and specifications for requirements of special equipment. Verify connection requirements before bidding.

**1.26 ELECTRICAL EQUIPMENT CONNECTIONS**

- A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Provide heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.
- B. Provide for Owner furnished and Contractor furnished equipment all power wiring, electric equipment, control wiring, switches, lights, receptacles, and connections as required.
- C. Refer to Manufacturer's drawings/specifications for requirements of special equipment. Verify connection requirements before bidding.

**1.27 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT**

- A. Store Materials on dry base, at least 6 in. aboveground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.
- B. Refer to Section 016600 - Product Storage and Handling Requirements for additional information.
- C. The Contractor shall provide airtight plastic covers over all supply and return air openings prior to the start of construction. The plastic shall be maintained airtight throughout the project construction and removed only with the approval of the Engineer.

**1.28 FREEZING AND WATER DAMAGE**

- A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner.

**1.29 OWNER INSTRUCTIONS**

- A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

**1.30 OPERATION AND MAINTENANCE MANUALS**

- A. Refer to Section 017823 - Operation and Maintenance Data for requirements.

**1.31 RECORD DRAWINGS**

- A. Refer to Section 017840 - Record Documents for requirements.

**1.32 TEMPORARY HEATING AND COOLING**

- A. Systems and equipment installed as part of this project shall not be used for temporary heating or cooling.

**1.33 TEMPORARY FACILITIES**

- A. Refer to the Division 1 Sections, General Conditions and Supplementary Conditions.

**1.34 TEMPORARY LIGHT AND POWER**

- A. Refer to the Division 1 Sections, General Conditions and Supplementary Conditions.

**1.35 CLEANING**

- A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:
1. Thoroughly clean entire installation, both exposed surfaces and interiors.
  2. Remove all debris caused by work.
  3. Remove tools, surplus, materials, when work is finally accepted.

**1.36 SYSTEM START-UP AND TESTING**

- A. Prior to commencement of work, the Contractor(s) affecting such system shall survey all building electrical systems and components, including fire alarm, intrusion, communications, clock and computer; make written notice to the Owner regarding existing damages, missing items and incomplete systems. Prior to the conclusion of this project, the Contractor shall verify with the Engineer that all building system has been returned to their original conditions.
- B. The Contractor shall be responsible for providing temporary filter media over all supply air registers and diffusers during the HVAC system start-up procedure. The Contractor shall provide airtight plastic covers over all supply and return air openings prior to the start of construction. The plastic shall be maintained airtight throughout the project construction and removed only with the approval of the Engineer.

**1.37 ENERGY INCENTIVES**

- A. The Contractor, his Subcontractors and Suppliers shall provide to the Owner all paperwork necessary to support the Owners pursuit of incentives related to energy conservation as provided by NYSEERDA. This shall include at a minimum receipts for energy efficient equipment such as: lighting, motors, variable frequency drives, etc.

**1.38 INFECTION CONTROL**

- A. Construction procedures, temporary partitions, negative air systems, cleaning procedures, HVAC system isolation, dust control, etc. shall be in accordance with the infection control standards set forth by the Facility. A copy of the facilities standards are available from the Owner upon request.

**END OF SECTION**





## B. Check Valves:

1. 3 in. and Larger: IBBM, renewable seat and disc, bolted flange cap, flanged ends, 150 SWP; Milwaukee F-2974.
2. 2 in. and Smaller: Lead-free swing check with silicone bronze body, bonnet and trim, PTFE disc seat and stainless steel seat disc washer, 200 psi working pressure, Nibco T-413-Y-LF (threaded) or Nibco's S-413-Y-LF (solder).
3. Silent Type: Lead-free spring check with silicone bronze body, stainless steel trim and PTFE disc: 250 psi working pressure; Nibco T-480-4-LF (threaded) or Nibco S-480-Y-LF (solder).

## C. Ball Valves:

1. 3 in. and Smaller: Lead-free, 3-piece brass body, 316 stainless steel ball, full port, teflon seats and stem packing, separate packing and handle nut, blowout proof stem extended for insulation, vinyl insulator for handle, 600 WOG, 125 SWP; Watts LFB6800 Series (threaded ends) or Watts LFB6801 series (sweat ends).

## D. Pressure Reducing Valves:

1. Direct Operated for Cold Water Service:
  - a. Bronze body construction, renewable stainless steel seat, reinforced Buna-N diaphragm and valve disc integral strainer, adjustable reduced pressure range, for dead end service
  - b. Acceptable Manufacturers: Watts Series #223, Cash, Spence or approved equal.
2. Pilot Operated for Cold Water Service:
  - a. Globe or angle pattern, flanged ends, epoxy coated, ductile or cast iron body, bronze seat, stainless steel trim, hydraulically operated, diaphragm actuated, pilot controlled, adjustable pressure settings, pressure gauges, UL labeled, minimum 150 psi WWP for entire assembly.
  - b. Acceptable Manufacturers: Watts, Bermad, Spence or approved equal.

## E. Valves for Gauges and Instruments:

1. 1/2 in. Size: Brass bar stock for 1000 psi and 300°F; Trerice No. 735 needle valve.

## F. Hose Thread Drain Valves:

1. Ball valve, bronze body, hardened chrome ball with hose thread end, cap and chain; Watts #LFB6001CC (sweat connection), Watts #LFB6000CC (threaded connection).

**PART 3 - EXECUTION**

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**3.1 INSTALLATION**

- A. Provide all shutoff, check and other type valves as indicated, as required by Code and as required for proper system maintenance, isolation and safety. Provide at major building and systems sections. Provide shutoff valves on all branch lines serving two fixtures or more, at all equipment, fixtures, before and after automatic control valves, and at future connections.
- B. Locate valves for easy access and provide separate support where necessary. Install valves with stems at or above the horizontal position. Install swing check valves in horizontal position with hinge pin level.
- C. Provide drain valves with hose thread connections on all equipment. Provide hose thread drain valves at all low points to enable complete drainage of all piping systems including, water mains, branches, at base of vertical risers and at strainers.
- D. Provide shutoff valve and wye-strainer before all automatic control valves and pressure reducing valves.
- E. Inspect valves for proper operation before installation. Install underground valve boxes vertically over each valve. Adjust top of box to proper grade. Immediately backfill with crushed stone and carefully tamp into place. Unless otherwise noted, leave in the open position.

**3.2 DOMESTIC WATER SYSTEM**

- A. The main water service shutoff valve inside the building and valves for a 3 in. and larger water meter assembly shall be OS&Y gate valves in accordance with the local water authority requirements.

**END OF SECTION**

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## **PART 3 - EXECUTION**

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### **3.1 GENERAL**

- A. Check electrical wiring pertaining to equipment for completeness and correctness of connections. Correct any misapplied motor and/or motor starter, improper thermal overload device, or device which fails to function and resultant damage, whether due to incorrect connections or improper information on wiring diagrams.

### **3.2 WIRING FOR CONTROL SYSTEMS**

- A. Provide motor control and instrumentation wiring for equipment. All wiring shall be in conduit, unless otherwise noted. Refer to Section 260501 for type of conduit to be used in specific applications. Provide 18 in. length flexible conduit at motors and devices subject to vibration. Conduit supported on 5 ft. centers. Do not attach directly to hot surfaces, piping, or ductwork. Control wiring shall be in separate conduit from all other wiring. Provide green grounding wire circuited from starter, and run ground wire through conduit to each remote auxiliary relay, pushbutton station, remote panel heating device, thermostat, or device with potentials in excess of 50 volts. Size ground wire as required by NEC.
- B. Provide pushbutton stations, pilot lights, selector switches, auxiliary starter contacts, and other devices required to provide specified functions.

### **3.3 EQUIPMENT WIRING**

- A. Provide power and control wiring between shipping splits, and between remote panels, thermostats, disconnect switches, and their respective units. Provide control wiring from the package control system, to each respective motor or device. Properly mount control package. Power wiring to and including disconnect switch shall be by Division 26 "Electrical".

### **3.4 FIELD WIRING IN STARTERS, CONTROLLERS, AND PANELS**

- A. Wiring within starters, controllers, and panels, shall be routed neatly in gutter space, away from moving and/or heat producing parts. Provide 30 ampere, 600 volt rated terminal blocks. Do not place more than two wire connections on pilot device or relay terminal. Where more than two circuit connections are required, use terminal blocks. Provide nylon self-insulated, locking type spade lugs for all control wires. Cables and wires shall be neatly bundled and lashed with nylon cable straps.

**END OF SECTION**

**SECTION 22 05 53  
PLUMBING IDENTIFICATION**

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**PART 1 - GENERAL**

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**1.1 WORK INCLUDED**

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

**1.2 QUALIFICATIONS**

- A. All identification devices shall comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles.

**1.3 SUBMITTALS**

- A. Submit manufacturer's technical product data and installation instructions for each identification material and device. Submit valve schedule for each piping system typewritten on an 8-1/2 in. x 11 in. paper (minimum), indicating valve number, location and valve function. Submit schedule of pipe, equipment and name identification for review before stenciling or labeling.

**1.4 MAKES**

- A. Allen Systems, Inc., Brady (W.H.) Co.; Signmark Div., Industrial Safety Supply Co., Inc., Seton Name Plate Corp.

**PART 2 - PRODUCTS**

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**2.1 GENERAL**

- A. Provide manufacturer's standard products of categories and types required for each application. In cases where there is more than one type specified for an application, selection is installer's option, but provide single selection for each product category.
- B. All adhesives used for labels in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits as called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.
- C. For work within an existing building, the mechanical identification shall meet the intent of this section, but match the Owner's existing identification symbology.

**2.2 PIPING IDENTIFICATION**

- A. Identification Types:
1. Pressure Sensitive Type: Provide manufacturer's standard pre-printed, permanent adhesive, color coded, pressure sensitive vinyl pipe markers complying with ANSI A13.1. Provide a 360° wrap of flow arrow tape at each end of pipe label.

2. Snap-On Type: Provide manufacturer's standard pre-printed, semi rigid snap-on, color coded pipe markers, complying with ANSI-A13.1.
3. Stencil Paint: Apply black or yellow stencil paint directly to covering or bare pipe; color to contrast with background. Stencil as follows:

O.D. PIPE OR COVERING	SIZE STENCIL LETTER
3/4 in., 1 in., 1-1/4 in.	1/2 in.
1-1/2 in., 2 in.	3/4 in.
2-1/2 in. and over	1 in.

B. Lettering:

1. Piping labeling shall conform to the following list:

PIPE FUNCTION	IDENTIFICATION
Cold Water	DOMESTIC COLD WATER
Indirect Waste	INDIRECT WASTE
Non-Potable Water	NON-POTABLE WATER
Potable Water	POTABLE WATER
Seal Water Supply	SEAL WATER SUPPLY
Process Water	PROCESS WATER
Plant Water	PLANT WATER

### 2.3 VALVE IDENTIFICATION

A. Valve Tags:

1. Standard brass valve tags, 2 in. diameter with 1/2 in. high black-filled numerals. Attach to valve with brass jack chain and "S" hook. Identify between heating and plumbing services with 1/4 in. letters above the valve number.
2. Acceptable Manufacturers: Seton Style No. M4507, or approved equal.

B. Valve Chart:

1. Provide valve chart for all valves provided as a part of this project. Frame and place under clear glass. Mount in an area approved by the Owner.

### 2.4 EQUIPMENT IDENTIFICATION

A. General:

1. Provide engraved vinyl nameplates for each major piece of mechanical equipment provided, 2-1/2 in. x 3/4 in. size.
2. Acceptable Manufacturers: Seton Style No. M4562, or approved equal.



## **PART 3 - EXECUTION**

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### **3.1 GENERAL**

- A. Provide valve tags for all valves provided on project.
- B. Provide equipment tags for all equipment provided on project.
- C. Provide piping identification with directional flow arrows for all piping on project, maximum intervals of 20'-0". For piping installed through rooms, provide at least one (1) pipe label in each room, for each pipe function.

**END OF SECTION**

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**SECTION 22 07 00  
INSULATION**

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**PART 1 - GENERAL**

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**1.1 WORK INCLUDED**

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

**1.2 SUBMITTAL**

- A. Provide product description, manufacturer's installation instructions, types and recommended thicknesses for each application, and location of materials.

**PART 2 - PRODUCTS**

---

**2.1 GENERAL**

- A. Insulation, jackets, adhesive, and coatings shall comply with the following:
1. Treatment of jackets or facing for flame and smoke safety must be permanent. Water-soluble treatments not permitted.
  2. Insulation, including finishes and adhesives on the exterior surfaces of pipes and equipment, shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less.
  3. Asbestos or asbestos bearing materials are prohibited.
  4. Comply with 2012 International Energy Conservation Code as amended by Chapter 2 of the 2014 Supplement to the New York State Energy Conservation Code, titled "Amendments to the 2012 IECC".
  5. All adhesives and sealants used for insulation in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits as called for in the current version of U.S. Green Building Council LEED Credits EQ E4.1 and EQ E4.2.
  6. Provide materials which are the standard products of manufacturers regularly engaged in the manufacture of such products and that essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Provide insulation systems in accordance with the approved MICA or NAIMA Insulation Standards.
  7. Insulation shall be clearly marked with manufacturer's name, identification of installed thermal resistance (R) value, out-of-package R value, flame spread and smoke developed indexes in accordance with Energy Code requirements.

**2.2 ACCEPTABLE MANUFACTURERS**

- A. Fiberglass: Knauf, Manville, Owen-Corning, Certaineed
- B. Polyisocyanurate: Dow Trymer 2000XP, HyTherm.

- C. Calcium Silicate: Industrial Insulation Group (ILG).
- D. Adhesives: Childers Products, Foster.

### 2.3 PIPE INSULATION (RIGID FIBERGLASS TYPE)

- A. Glass Fiber: Pipe Insulation meeting ASTM C 547, ASTM C 585, and ASTM C 795; rigid, molded, noncombustible.
- B. 'K' Value: ASTM C 335, 0.23 at 75°F mean temperature. Maximum Service Temperature: 1000°F.
- C. Vapor Retarder Jacket: ASJ/SSL conforming to ASTM C 1136 Type I, secured with self-sealing longitudinal laps and butt strips.
- D. Field-Applied PVC Fitting Covers with Flexible Fiberglass Insulation: Proto Corporation 25/50 or Indoor/Outdoor, UV-resistant fittings, jacketing and accessories, white or colored. Fitting cover system shall consist of pre-molded, high-impact PVC materials with blanket type fiberglass wrap inserts. Blanket fiberglass wrap inserts shall have a thermal conductivity ('K') of 0.26 at 75°F mean temperature. Closures shall be stainless steel tacks, matching PVC tape, or PVC adhesive per manufacturer's recommendations.
- E. Prefabricated Thermal Insulating Fitting Covers: Comply with ASTM C 450 for dimensions used in pre-forming insulation to cover valves, elbows, tees, and flanges.

### 2.4 PIPE INSULATION (RIGID POLYISOCYANURATE TYPE)

- A. Preformed Rigid Polyisocyanurate Insulation: Cellular foam complying with ASTM C591, rigid molded, non-combustible. 2-lb./ft<sup>3</sup> nominal density. Maximum thermal conductivity (k) shall be 0.19 BTU-in/ft<sup>2</sup> hr. °F at 75°F mean temperature.

### 2.5 CALCIUM SILICATE

- A. Flat-, curved- and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I, rated for a maximum temperature of 1700 degree F.

### 2.6 FIELD-APPLIED JACKETS

- A. Piping:
  1. PVC Pipe Jacket: High-impact, ultraviolet-resistant PVC; 30 mils thick; roll stock ready for shop or field cutting and forming. Adhesive: As recommended by insulation material manufacturer. PVC Jacket Color: White.

### 2.7 PIPE SUPPORT INSULATION INSERTS

- A. 20 lbs./cu. ft. molded fiberglass, for -120°F to +450°F service temperature, non-combustible, 0.30 thermal conductivity (k), same thickness as pipe insulation.

- B. Acceptable Manufacturers: Hamfab "H" Block, or approved equal.

## 2.8 MATERIALS AND SCHEDULES

- A. See Exhibits at the end of this section.

## PART 3 - EXECUTION

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### 3.1 GENERAL REQUIREMENTS

- A. All materials shall be installed by skilled labor regularly engaged in this type of work. All materials shall be installed in strict accordance with manufacturer's recommendations, building codes, and industry standards.
- B. Locate insulation and cover seams in the least visible location. All surface finishes shall be extended in such a manner as to protect all raw edges, ends and surfaces of insulation. No glass fibers shall be exposed to the air.
- C. All pipe insulation shall be continuous through hangers, sleeves, walls, ceiling, floor, or roof openings, unless not allowed by fire stop system. Refer to Section 220500 "Basic Requirements" for firestop systems.
- D. Provide thermal insulation on clean, dry surfaces and after piping and equipment (as applicable) have been tested. Do not cover pipe joints with insulation until required tests are completed.
- E. All cold surfaces that may "sweat" must be insulated. Vapor barrier must be maintained; insulation shall be applied with a continuous, unbroken moisture and vapor seal. All hangers, supports, anchors, or other projections that are secured to cold surfaces shall be insulated and vapor sealed to prevent condensation. Cover valves, fittings and similar items in each piping system with insulation as applied to adjoining pipe run. Extra care must be taken on piping appurtenances to insure a tight fit to the piping system.
- F. Items such clean-outs, plugged connections, pet cocks, air vents, ASME stamp, and manufacturers' nameplates, may be left un-insulated unless omitting insulation would cause a condensation problem. When such is the case, appropriate tagging shall be provided to identify the presence of these items. Provide neatly beveled edges at interruptions of insulation.
- G. Provide protective insulation as required to prevent personal injury.
- H. All pipes shall be individually insulated.
- I. If any insulation material becomes wet because of transit or job site exposure to moisture or water, the Contractor shall not install such material, and shall remove it from the job site.
- J. All exposed surfaces shall be white, unless noted otherwise.

### 3.2 PIPE INSULATION

- A. Insulate piping systems including fittings, valves, flanges, unions, strainers, and other attachments installed in piping system, whether exposed or concealed.
- B. Insulation installed on piping operating below ambient temperatures must have a continuous vapor retarder. All joints, seams and fittings must be sealed. Insulation shall be continuous through hangers on all water piping and storm water piping.
- C. Hanger Shields: Refer to Section "Piping Systems and Accessories".
- D. Hanger shields shall be installed between hangers or supports and the piping insulation. Rigid insulation inserts shall be installed as required between the pipe and the insulation shields. Inserts shall be of equal thickness to the adjacent insulation and shall be vapor sealed as required.
  - 1. Pre-Insulated Type: Butt insulation to hanger shields and apply a wet coat of vapor barrier cement to the joints and seal with 3 in. wide vapor barrier tape.
  - 2. Field Insulated Type: Provide Hamfab Co. "H" blocks per manufacturers recommended spacing between pipe and shield.
  - 3. Tape shields to insulation.
- E. Joints in section pipe covering made as follows:
  - 1. All ends must be firmly butted and secured with appropriate butt-strip material. On high-temperature piping, double layering with staggered joints may be appropriate. When double layering, the inner layer should not be jacketed.
  - 2. Standard: Longitudinal laps and butt joint sealing strips cemented with white vapor barrier coating, or factory supplied pressure sensitive adhesive lap seal.
  - 3. Vapor Barrier: For cold services, Longitudinal laps and 4 in. vapor barrier strip at butt joints shall be sealed with white vapor barrier coating. Seal ends of pipe insulation at valves, flanges, and fittings with white vapor barrier coating.
- F. Fittings, Valves and Flanges:
  - 1. Domestic Hot and Cold Water: Premolded fitting insulation of the same material and thickness as the adjacent pipe insulation.
  - 2. White PVC jacketing, with continuous solvent weld of all seams. Tape all fittings.
- G. Apply PVC jacket where indicated, with 1 in. overlap at longitudinal seams and end joints. Seal with manufacturers recommended adhesive.
- H. Apply PVC jacketing to exposed insulated pipe, valves, fittings, and specialties, at an elevation of 8 feet or less above finished floor in mechanical/electrical rooms, penthouses, and services aisles/pipe chases. Fittings shall be standard PVC fitting covers. Jacketing for piping in existing areas shall match existing jacketing.

- I. All exposed piping less than 8'-0" above finished floor in occupied spaces shall be insulated with polyisocyanurate insulation (for cold services) or calcium silicate (for hot services) and rigid fiberglass fittings. All exposed piping shall have a continuous 30 mil thick white PVC jacketing.
- J. Piping in exterior walls, spaces, overhangs, attics, or where subject to freezing: Insulate pipe with double the thickness called for. Piping in wall chases: In addition to the above, pack chase with loose glass fiber insulation.
- K. Provide insulation on exposed hot and cold plumbing piping to within 18 in. of fixture or equipment connection.

**3.3 EXISTING INSULATION**

- A. Patch existing insulation damaged during the course of the work.
- B. Insulate existing piping and equipment as called for.
- C. Jacketing for piping in existing areas shall match existing jacketing.

**EXHIBIT "I" - PIPE INSULATION MATERIALS**  
**(Notes at end of Exhibit "I")**

<u>SERVICE</u>	<u>INSULATION MATERIAL</u>	<u>THICKNESS</u>	<u>REMARKS</u>
Domestic cold water, Retable water, branstpotable water	Glass fiber	4 in. and larger: 1 in. 3 in. and smaller: 1/2 in.	SEE NOTE 1
Non potable cold water, process water	Glass fiber	4 in. and larger: 1 in. 3 in. and smaller: 1/2 in.	SEE NOTE 1
Domestic hot, tempered and circulation water (up to 140°)	Glass fiber	All sizes: 1 in.	SEE NOTE 1

**NOTES FOR EXHIBIT I:**

**NOTE 1:** Exposed insulation in occupied spaces shall be covered with PVC jacket.

**END OF SECTION**

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**SECTION 22 10 10**  
**PIPING SYSTEMS AND ACCESSORIES**

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**PART 1 - GENERAL**

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**1.1 WORK INCLUDED**

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

**1.2 SUBMITTALS**

- A. Provide a schedule of pipe materials, fittings and connections.
- B. Provide a detailed matrix listing the specific UL approved firestop system assembly to be used for each type of piping provided and each type of construction to be penetrated along with all associated UL assembly details.

**PART 2 - PRODUCTS**

---

**2.1 GENERAL**

- A. Pipe and fittings shall be new, marked with manufacturer's name and comply with applicable ASTM and ANSI Standards.
- B. All items here-in used to convey water for potable use shall be lead free in accordance with NSF, Standard 61, Section 9 - Standard for Drinking Water and Lavatory Faucets and NSF Standard 372 - Maximum Lead Requirements. Compliance shall be via third party testing and certification.
- C. All adhesives, sealers and primers used for piping in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ4.1 and EQ4.2.

**2.2 STEEL PIPING AND FITTINGS**

- A. Pipe: ASTM A53, or ASTM A106 seamless, Schedule 40 or Schedule 80 weight; black or galvanized finish as called for; ends chamfered for welding or grooved for grooved mechanical connections.
- B. Fittings: Same material and pressure class as adjoining pipe.
  - 1. Welded fittings: Factory forged, seamless construction, butt weld type chamfered ends. Where branch connections are two or more sizes smaller than main size, use of "Weldolets", "Thredolets" or "Sockolets" acceptable. Mitered elbows, "shaped" nipples, and job fabricated reductions not acceptable unless specifically called for. Socket weld type, 2000 psi wp, where called for.

2. Threaded fittings: Cast or malleable iron, black or galvanized, as called for; drainage type where called for; UL listed and FM approved for fire protection systems. Street type 45° and 90° elbows are not acceptable.
- C. Flanges, Unions, and Couplings:
1. Threaded Connections:
    - a. Flanges: Cast iron companion type; for sizes 2-1/2 in. and larger.
    - b. Unions: Malleable iron, bronze to iron seat, 300 lb. wwp; for sizes 2 in. and smaller.
    - c. Couplings: Malleable iron. Steel thread protectors are not acceptable as couplings.
  2. Welded Connections:
    - a. Flanges: Welding neck type. Slip-on type not allowed unless noted and shall not be installed in conjunction with butterfly valves.
  3. Grooved Mechanical Connections:
    - a. Couplings: Ductile iron, ASTM A536, with painted coating, designed for rolled grooved piping, hot dipped galvanized finish were called for.
    - b. Gaskets: Grade "E" EPDM synthetic rubber, -30°F to 230°F temperature range, suitable for water service.
    - c. Bolts and Nuts: Heat treated, hex head carbon steel, ASTM A183, cadmium plated or zinc electroplated.
    - d. Fittings: Elbows, tees, laterals, reducers, adapters as required. Same construction as couplings.
    - e. Design Equipment: Victaulic, rigid system, Style 07 couplings.
    - f. Acceptable Manufacturers: Central, Gruvlok, Victaulic.
- D. Gauge and Instrument Connections: Nipples and plugs for adapting gauges and instruments to piping system shall be IPS brass.
- E. Base Elbows:
1. Cast iron or steel type, flange connections; Crane 500 or equivalent made from welding elbows, with welded pipe support and steel base. Reducing elbows where necessary.

Elbow Size	Support Size	Base Plate
Up to 3 in.	1-1/4 in.	6 in. x 6 in. x 1/4 in.
4 in. to 6 in.	2-1/2 in.	8 in. x 8 in. x 1/4 in.
8 in. and larger	6 in.	14 in. x 14 in. x 5/16 in.

2. Anchor bolt holes in each corner of base for securely bolting to floor or concrete base; minimum 3/4 in. bolts.

### 2.3 COPPER TUBE AND FITTINGS

- A. Pipe: ASTM B88; Type K or L, hard temper. Soft temper only as called for. Plans show copper tube sizes.
- B. Tees, Elbows, Reducers: Wrought copper, ASME B16.22 or cast bronze, ASME B16.18; solder end connections.
- C. Unions and Flanges: 2 in. and smaller use unions, solder type, cast bronze, ground joint, 150 lb. swp; 2-1/2 in. and over use flanges, cast bronze, companion type, ASME drilled, solder connection, 150 lb. swp.
- D. Flux Materials: Flux shall comply with ASTM B813 and the provisions of the New York State Plumbing Code.
- E. Solder Materials: No-lead solder, using alloys made from tin, copper, silver and nickel. Harris, Inc., "Stay-Safe 50" and "Bright", Engelhard "Silvabright 100", Canfield "Watersafe" or approved equal.
- F. Brazing Materials: Class BcuP-5 for brazing copper to brass, bronze to copper. Harris, Inc. "Stay-Silv 15" or approved equal.

### 2.4 COPPER TUBE AND FITTINGS - PRESS FITTINGS

- A. Tubing Standard: Copper tubing shall conform to ASTM B75 or ASTM B88.
- B. Fitting Standard: Copper fittings shall conform to ASME B16.18, ASME B16.22, or ASME B16.26.
- C. Press Fitting: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM.
- D. Acceptable Manufacturers: Viega.

### 2.5 COPPER TUBE AND FITTINGS - GROOVED MECHANICAL CONNECTIONS

- A. Pipe: ASTM B88, Type K or L, hard temper.
- B. Fittings: Wrought copper, roll grooved mechanical connections, ASTM B-75, ANSI B16.22 for 4 in. size. Cast bronze, rolled grooved mechanical connections, ASTM B-584, ANSI B16.18 for sizes 5 in. - 8 in.
- C. Couplings: Ductile iron, ASTM A-536, with copper colored alkyd enamel finish, designed for rolled grooved piping.
- D. Gaskets: Grade "E" EPDM synthetic rubber, copper color coded, -30°F to 230°F temperature range, suitable for water service.
- E. Bolts and Nuts: Heat treated, hex head carbon steel, ASTM A183, cadmium plated or zinc electroplated finish.

- F. Design Equipment: Victaulic Style 606 couplings.
- G. Acceptable Manufacturers: Central, Gruvlok, Victaulic.

## 2.6 COPPER DRAINAGE TUBE AND FITTINGS

- A. Pipe: ASTM B306, Type DWV, hard temper.
  - 1. Copper not allowed for urinal waste.
- B. Fittings: Wrought copper, ANSI B16.29 or cast bronze, ANSI B16.23; solder end connections.
- C. Flux Materials: Flux shall comply with ASTM B813 and the provisions of the New York State Plumbing Code.
- D. Solder Materials: No lead solder, using alloys made from tin, copper, silver and nickel.
- E. Acceptable Manufacturers: Harris, Inc., "Stay-Safe 50" and "Bright", Engelhard "Silvabright 100", Canfield "Watersafe", or approved equal.

## 2.7 HUB AND SPIGOT CAST IRON SOIL PIPE AND FITTINGS

- A. Pipe: ASTM A74 service weight cast iron, bitumen coated.
- B. Fittings: Cast iron, service weight, hub and spigot, drainage pattern, bitumen coated.
- C. Connections: ASTM C564 neoprene gaskets and lubricant.
- D. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

## 2.8 NO-HUB CAST IRON SOIL PIPE AND FITTINGS

- A. Pipe: ASTM A888, CISPI Standard 301, no-hub cast iron, bitumen coated.
  - 1. For above grade only.
- B. Fittings: Cast iron, no-hub drainage pattern, bitumen coated.
- C. Couplings:
  - 1. 1-1/2 in. to 2 in.: CISPI standard 310 with 300 series stainless steel corrugated shield and clamp assembly with ASTM C564 neoprene sealing sleeve (or) same as specified for 3 in. and larger.
  - 2. 3 in. and Larger: 24 gauge, Type 304 stainless steel housing clamp assembly with ASTM C564 neoprene sealing sleeve, 60 in. lbs. minimum torque rating, shall meet requirements of pipe manufacturer and shall be compatible with specified pipe. Acceptable Manufacturers: Clamp-All Coupling System, Tyler "Wide Body", Husky "Series 2000", Mission "Heavy Weight" or approved equal.

- D. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

## 2.9 PVC SOLID WALL PIPE AND FITTINGS - DWV SYSTEM

- A. Pipe: PVC Schedule 40 solid wall pipe, iron pipe size conforming to ASTM D1785 and ASTM D2665. Pipe shall be manufactured from PVC compounds as identified in ASTM D1784. Both pipe and fittings shall conform to National Sanitation Foundation Standard 14.
- B. Fittings: Type DWV, socket type conforming to ASTM D2665. Fittings shall be manufactured from PVC compounds as identified in ASTM D1784. Solvent cement joints shall be made utilizing a two-step process with primer manufactured for thermoplastic piping and solvent cement conforming to ASTM D2564.

## 2.10 SPECIAL FITTINGS

- A. Cast Iron to Lead Pipe: Red brass ferrules and wiped joints. Caulk ferrule into cast iron hub.
- B. Copper to Cast Iron: Cast bronze, cast iron to sweat adapter.
- C. Copper to Steel Piping:
  1. Cast bronze copper to iron male or female adapter with shoulder for drainage piping only.
  2. Dielectric pipefittings.
- D. Steel to Cast Iron: Cast iron soil pipe connector with spigot and IPS male thread end (Manhoff fittings).
- E. No-Hub, Cast Iron: Proper adapter to piping being connected.

## 2.11 DIELECTRIC PIPE FITTINGS

- A. Description: Assembly or fitting having insulating material isolating joined dissimilar metals to prevent galvanic action and stop corrosion.
- B. Unions: Factory fabricated, for 250 psi minimum working pressure at 180°F, threaded or solder ends, insulating material suitable for system fluid, pressure and temperature.
- C. Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300 psig minimum pressure to suit system fluid pressures and temperatures with flange insulation kits and bolt sleeves.
- D. Acceptable Manufacturers: EPCO, Capitol Manufacturing, Watts or approved equal.

## 2.12 HANGERS, INSERTS AND SUPPORTS

- A. Hangers, Inserts, Clamps: B-Line, Grinnell, Michigan Hanger, PHD Manufacturing.

B. Hangers:

1. Adjustable, wrought malleable iron or steel with electroplated zinc or cadmium finish. Copper plated or PVC coated where in contact with copper piping.
2. Adjustable ring type where piping is installed directly on hanger for piping 3 in. and smaller.
3. Adjustable steel clevis type for piping 4 in. and larger.
4. Nuts, washers and rods with electroplated zinc or cadmium finish.
5. Provide hot dipped galvanized finish for hangers and accessories installed in exterior locations and interior areas with moist environment conditions such as pools, pool filter rooms, areaways, garages and similar areas.

C. Spacing Schedule:

Pipe Size	Steel	Copper	Plastic	Cast Iron	Rod Size
3/4 in. to 1 in.	8 ft.	6 ft.	3 ft.	Each Horizontal Joint 5 ft. Maximum O.C.	3/8 in.
1-1/4 in. to 2 in.	10 ft.	6 ft.	3 ft.		3/8 in.
2-1/2 in. to 4 in.	12 ft.	10 ft.	4 ft.		1/2 in.
5 in. and over	12 ft.	10 ft.	4 ft.		5/8 in.
8 in.	12 ft.	10 ft.	4 ft.		3/4 in.
Over 8 in.	To suit loading conditions.				

D. Cast Iron No-Hub Supports:

1. In accordance with manufacturer's recommendations.
2. Vertical piping supported at each stack base and at each floor. Freestanding vertical pipe should be adequately staked or braced during construction to maintain alignment. Bases of stacks shall be supported on concrete, brick laid in cement mortar, metal brackets attached to the building construction or by other methods approved by the Owner's Representative.
3. Horizontal piping supported within 24 in. each side of the coupling joint at 10 ft. intervals for 10 ft. pipe lengths and at 5 ft. intervals for 5 ft. pipe lengths. Supports or hangers placed to maintain alignment and grade with provision made to prevent shear. Greater than 3 in. diameter pipe braced at changes of direction to prevent horizontal movement.

E. Beam Attachments:

1. C-Clamp style, locknut, restraining strap, electroplated finish, UL listed, FM approved for pipe sizes 2 in. and smaller.
2. Center loaded style with clamp attachments that engage both edges of beam, electroplated finish, UL listed, FM approved, for pipe sizes larger than 2 in., refer to "Supports" for additional requirements.

F. Inserts: Carbon steel body and square insert nut, galvanized finish, maximum loading 1300 lbs., for 3/8 in. to 3/4 in. rod sizes, reinforcing rods on both sides, MSS-SP-69 Type 19 or approved equal.

## G. Supports:

1. Provide intermediate structural steel members where required for hanger attachment. Members shall span across the bar joists at panel points of joists. Secure member to structure. Select size of members based on a minimum factor of safety of four.
2. For Weights Under 1000 lbs.: "Drill-In" inserts, "U" shaped Channel, beam clamps or other structurally reviewed support. The factor of safety shall be at least four. Follow manufacturer's recommendations.
3. For Weights Above 1000 lbs.: Drill through floor slabs and provide flat flush plate welded to top of rod or provide additional "Drill-In" inserts and hangers to reduce load per hanger below 1000 lbs.
4. For Metal Decks: Drill hole through for hanger rods and imbed a welded plate in concrete or use devices designed for this application, with a safety factor of four.
5. Acceptable Manufacturers: Hilti, ITW Ramset, Phillips "Red Head" or approved equal.

## H. Trapeze Hangers:

1. For plumbing systems only.
2. Hangers shall be supported with rod sized with a safety factor of four.
3. May be manufactured type "U" shaped channel, or suitable angle iron or channel. Round off all sharp edges.
4. Securely fasten piping to trapeze with "U" bolt or pipe clamps, dissimilar metals shall not touch, use isolation gaskets. Fasten piping to trapeze at every third support.
5. Acceptable Manufacturers: B-Line, Kindorf, Unistrut or approved equal.

## I. Cabinet Pipe Space Supports:

1. Piping below casework countertops within space behind cabinet shall be supported using continuous slot metal channels with pipe clamps.
2. Acceptable Manufacturers: B-Line, Kindorf, Unistrut or approved equal.

## J. Hanger Insulation Shields:

1. Hanger insulation shields shall be provided for all water and storm water piping. Hangers shall attach directly to pipe for all remaining services.
2. Piping 2 in. and Smaller: Pipe insulated with glass fiber insulation shall be protected at point of support by a sheet metal shield. Shield shall be #18 gauge, galvanized steel, minimum 120 degree arc, formed to fit insulation thickness and 12 in. long. Tape shields to pipe insulation.
3. Piping 3 in. and Larger: Pipe insulated with glass fiber insulation shall be protected at point of support by a sheet metal shield and pipe support insulation insert(s) between pipe and hanger. Shield shall be #18 gauge, galvanized steel, minimum 120 degree arc, formed to fit insulation thickness and 12 in. long. Tape shields to pipe insulation. Provide temporary blocking to maintain proper spacing for insulation.

- K. Piping systems with material not listed above shall be supported and protected in accordance with manufacturer's recommendations.

### 2.13 PIPING ACCESSORIES

- A. Escutcheon Plates: Steel or cast brass, split hinge type with setscrew, high plates where required for extended sleeves. Chrome plated in finished areas and at plumbing fixtures.
- B. All cleanout plugs, bushings and nipples, required for instruments and gauges shall be brass.

### 2.14 SLEEVES

- A. Standard Type:
  1. Schedule 40 black steel pipe sleeves for structural surfaces, two pipe sizes larger than the pipe, and as recommended by the sealing element manufacturer. Provide full circle water stop collar for sleeves located within below grade walls, wet wells and waterproofed surfaces. The collar shall be fabricated from steel plate and welded to the sleeve around its entire circumference.
  2. Schedule 40 PVC sleeves or sheet metal sleeves for nonstructural surfaces and existing construction. Sheet metal sleeves shall be 18 gauge minimum and braced to prevent collapsing.

### 2.15 SEALING ELEMENTS

- A. Expanding neoprene link type, watertight seal consisting of interlocking links with zinc plated bolts.
  1. Acceptable Manufacturers: Thunderline "Link-Seal" Series 200, 300 or 400, Pyropac, Calipco.

### 2.16 FIRESTOP SYSTEM FOR OPENINGS THROUGH FIRE RATED WALL AND FLOOR ASSEMBLIES

- A. Materials for firestopping seals shall be listed by an approved independent testing laboratory for "Through-Penetration Firestop Systems". The system shall meet the standard fire test for Through-Penetration Firestop Systems designated ASTM E814. Firestop system seals shall be provided at locations where piping pass through fire rated wall, floor/ceiling, or ceiling/roof assembly. Minimum required fire resistant ratings of the assembly shall be maintained by the Firestop System. Installation shall conform with the manufacturer's recommendations and other requirements necessary to meet the testing laboratory's listing for the specific installation.

### 2.17 STRAINERS

- A. Description: Y-Pattern, self-cleaning, except where otherwise indicated, full size of connecting piping, Type 304 stainless steel screens, 125 lb. SWP, unless otherwise indicated.



- B. Copper Piping 2-1/2 in. and Smaller: Lead free, cast bronze body, threaded ends, tapped retainer cap with closure plug, 20 mesh screen, Watts #LF777S.
- C. Steel Piping 2-1/2 in. and Smaller: Iron body, threaded ends, tapped retainer cap with closure plug, 20 mesh screen, Watts #77S
- D. Piping 3 in. and Larger, Cold Water Applications: Lead free, cast iron body, flanged ends, standard screen openings, FDA approved epoxy coating, tapped retainer cap and gasket with closure plug; Watts #77F-DI-FDA-125.

## 2.18 PIPING MATERIALS AND SCHEDULE

- A. See Exhibit "A", "Schedule of Piping Materials" at end of this Section for (Plumbing) piping.
- B. See Exhibit "B", "Testing" at end of this Section.

## PART 3 - EXECUTION

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### 3.1 EQUIPMENT AND SYSTEMS

- A. Install equipment and systems in accordance with provisions of each applicable Section of these Specifications, and Local/State Codes/Regulations having jurisdiction. Accurately establish grade and elevation of piping before setting sleeves. Install piping without springing or forcing, except where specifically called for, making proper allowance for expansion and anchoring. Changes in sizes shall be made with reducing fittings. Reducing couplings are not acceptable. Arrange piping at equipment with necessary offsets, unions, flanges, and valves, to allow for easy part removal and maintenance. Offset piping and change elevation as required to coordinate with other work. Avoid contact with other mechanical or electrical systems. Provide adequate means of draining and venting units, risers, circuits and systems. Conceal piping unless otherwise called for. Copper tubing shall be cut with a wheeled tubing cutter or other approved copper tubing cutter tool. The tubing must be cut square to permit proper joining with the fittings. Ream pipes after cutting and clean before installing. Cap or plug equipment and pipe openings during construction. Install piping parallel with lines of building, properly spaced to provide clearance for insulation. Make changes in direction and branch connections with fittings. Do not install valves, unions and flanges in inaccessible locations. Materials within a system and between systems shall be consistent. If this is not possible, install dielectric fittings.

### 3.2 PIPING OVER ELECTRICAL EQUIPMENT

- A. Contractor shall route piping to avoid installation directly over electric equipment, including, but not limited to panels, transformers, disconnects, starters, motor control center, adjustable speed drives and fused switches.

- B. Piping shall not be installed in the dedicated electric and working space as defined by NEC 110. Dedicated electrical space is generally equal to the depth and width of electrical equipment, and extends 6 ft. above the electrical equipment, or to a structural ceiling. Dedicated working space is a minimum of 30 in. wide or the width of equipment (whichever is larger) a minimum of 6 ft.-6 in. tall, with a depth of 3ft. to 9 ft. depending on the voltage.

### 3.3 HANGERS, INSERTS AND SUPPORTS

- A. Piping shall not be supported by wires, band iron, chains, from other piping, or by vertical expansion bolts. Support piping with individual hangers from concrete inserts, wood construction, welded supports, or beams clamps of proper configuration and loading design requirements for each location; replace if not suitable. Follow manufacturer's safe loading recommendations. Suspend with rods of sufficient length for swing and of size called for, using four (4) nuts per rod. Provide additional structural steel members, having one coat rustproof paint, where required for proper support. Provide oversized hangers where insulation/supports must pass between pipe and hanger. Provide continuous support or extra supports for plastic piping per manufacturer's requirements. Hangers, when attached to joists, shall only be placed at the top or bottom chord panel point. Only concentric type hangers are permissible on piping larger than 2-1/2 in.; "C" types are permitted for piping 2 in. and smaller on joists. Provide riser clamps for each riser at each floor. Use trapeze hangers where a group of piping can be installed.

### 3.4 PIPE CONNECTIONS

- A. No-Lead Solder Connections: Nonacid flux and clean off excess flux and solder.
- B. Press Connections: Copper press fittings shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool approved by the manufacturer.
- C. Brazed Connections: Make joints with silver brazing alloy in accordance with manufacturer's instructions. Remove working parts of valves before applying heat.
- D. Threaded Connections: Clean out tapering threads, made up with pipe dope; screwed until tight connection. Pipe dope must be specifically selected for each application.
- E. Flanged Joints: Select appropriate gasket material, size, type and thickness for service applications. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- F. Dielectric Pipe Fittings: Provide dielectric unions at ALL equipment connections where dissimilar metals meet. In addition, provide dielectric unions in all open type piping systems (condensing water, domestic water, etc.) where dissimilar metals are to be joined.

- G. Grooved Mechanical Joints: Pipe to be prepared in accordance with the latest manufacturer's grooving specification. Use manufacturer's recommended grooving tools. Pipe shall be checked to be sure it is free of indentations, projections; weld seams or roll marks on the exterior of the pipe over the entire gasket seating area. Pipe ends are to be square cut. Lubricant shall be applied to gasket and/or pipe ends and housing interiors to eliminate pinching the gasket.
- H. Solvent-Cement Plastic Piping Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
  2. PVC Piping: Join according to ASTM D 2855.

### 3.5 WELDING

- A. Welding shall be performed in compliance with the welding procedure specifications prepared by the National Certified Pipe Welding Bureau. Welded pipe fabricated by certified welder. Contractor shall submit proof of current certification of each welder if requested by Owner. Use full-length pipe where possible; minimum distance between welds, 18 in. on straight runs. Welds must be at least full thickness of pipe inside smooth and remove cutting beads, slag and excess material at joints; chamfer ends. Minimum gap 1/8 in., maximum 1/4 in., for butt welds. Overlaps on position and bench welds to be not less than 3/4 in. One internal pass and one external pass minimum required on slip-on flanges. Do not apply heat to rectify distorted pipe due to concentrated welding; replace distorted pipe.
- B. Welding is prohibited in existing Building except in following areas:
  1. Basement areas.
- C. When welding galvanized pipe, apply cold galvanizing on joint following welding.

### 3.6 SLEEVES

- A. Provide for pipes passing through floors, walls or ceilings. Not required for floors that are core-drilled, except where floor is waterproofed.
- B. Extend 1/8 in. above finished floor in finished areas. In above grade Mechanical Rooms and other areas with floor drains, use steel pipe sleeves 2 in. above floor.
- C. Use steel pipe sleeves in bearing wall, structural slabs, beams and other structural surfaces, and where called for.
- D. Sleeves shall be as small as practical, consistent with insulation, so as to preserve fire rating.
- E. Fill abandoned sleeves with concrete.

- F. Provide rubber grommet seals for pipes passing through ducts or air chambers or built-up housings.

### 3.7 SLEEVE PACKING

- A. Seal void space at sleeves as follows:
  1. Interior Locations: Firmly pack with fiberglass and caulk.
  2. Exterior Walls and Below Grade Cored Holes: Use sealing element.
  3. Cored Holes: Use sealing element.
  4. Fire Rated, Partitions and Floor Slabs: Use fire rated sealing elements, materials and methods. Provide per manufacturer's instructions to maintain firestop.
  5. Waterproofed Walls/Floors: Use waterproof sealing element, device or compound.

### 3.8 ESCUTCHEON PLATES

- A. Provide polished chrome setscrew type escutcheon plates for all exposed piping passing through floors, walls or ceilings, in all rooms except in Boiler, Fan and Mechanical Rooms.

### 3.9 TESTS

- A. Refer to Exhibit "B" at the end of this section for testing of Plumbing Systems.
- B. Provide all necessary items to complete proper testing of work. Perform all testing in accordance with governing Codes, local utilities and other agencies having jurisdiction and as specified. Pay all costs to perform tests. Perform all testing in a safe manner. Isolate existing systems.
- C. Domestic Water:
  1. Do not cover joints with insulation until required tests are completed and the Owner's Representative accepts the system.
  2. Make leaks tight; no caulking permitted. Replace defective fittings, pipe or connections. Piping shall be tight and show no loss of pressure.
  3. Air test not acceptable as final test.
  4. Confirm in writing that tests and flushing have been conducted and successfully completed. Submit copy of the test report to Owner's Representative.
- D. Indirect Waste:
  1. There shall be no loss of water when testing interior piping.
  2. Air test not acceptable as final test.
  3. Should any leaks, defective joints or defective construction be detected in sewers and/or floors or walls of appurtenant structures, they shall be permanently stopped. Should any defective pipes, fitting or accessories be discovered they shall be removed and replaced at the Contractor's expense.

- 4. Confirm in writing that tests have been conducted and successfully completed. Submit copy of the test report to Owner's Representative.

**3.10 DOMESTIC WATER PIPING CLEANING AND DISINFECTION**

- A. Cleaning and disinfecting shall be in accordance with requirements of New York State Department of Health and authority having jurisdiction. Prior to disinfecting, flush piping to remove any sediment and debris.
- B. Clean and disinfect water distribution piping systems and parts of existing potable water systems that have been altered, extended or repaired.
- C. After disinfection procedures, submit water samples in sterile bottles to an approved Department of Health Laboratory. Samples shall be proven equal to the water quality served to the public from the existing water supply system and acceptable to the Department of Health. Flush and disinfect all sections of pipe that fail the laboratory tests. Submit test results indicating water is potable.

**3.11 CONNECTIONS TO SPECIAL EQUIPMENT**

- A. Special Equipment:
  - 1. Special equipment shall be furnished by others and set in place by others.
  - 2. Provide all piping, stops, valves, traps and fittings.
  - 3. Where exposed, provide chrome plated brass piping, valves, hangers, brackets and accessories.
  - 4. Pipe relief valves to floor. Size and arrangement of pipe, traps, valves and fittings, as recommended by manufacturer of equipment.

**3.12 PIPE LINE SIZING**

- A. Pipe sizes called for are to be maintained. Pipe size changes made only as reviewed by Owner's Representative. Where discrepancy in size occurs, the larger size shall be provided.

**EXHIBIT "A" - PIPING MATERIALS (PLUMBING)**  
 (Notes at end of Exhibit "A")

<u>SERVICE</u>	<u>PIPE MATERIALS</u>	<u>FITTINGS</u>	<u>CONNECTIONS</u>
Domestic water interior/hot, cold and circulating 3 in. and smaller	Type L copper	Wrought copper or cast bronze	No-lead solder
	Type L copper	Wrought copper or cast bronze	Press fit
Domestic water interior/hot, cold and circulating 4 in. and larger	Schedule 40 galvanized steel	Galvanized ductile iron	Roll grooved mechanical type couplings



<u>SERVICE</u>	<u>PIPE MATERIALS</u>	<u>FITTINGS</u>	<u>CONNECTIONS</u>
	Schedule 40 galvanized steel	Galvanized cast or malleable iron	Flanged
	Type L copper	Wrought copper	Brazed
	Type L copper	Wrought copper or cast bronze	Roll grooved mechanical type couplings
Non-potable water	Type L copper	Wrought copper or cast bronze	No-lead solder
	Type L copper	Wrought copper or cast bronze	Press fit
Indirect waste	Type DWV copper	Wrought copper	No-lead solder
	Schedule 40 PVC, solid wall	PVC, socket type	Solvent cement (SEE NOTE 1)
	Cast iron hub and spigot or no-hub	Cast iron	Neoprene gaskets or no-hub couplings

NOTES FOR EXHIBIT A:

NOTE 1: PVC piping shall not be installed within return air plenums.

EXHIBIT "B" - TESTINGSERVICETEST REQUIREMENTS

Domestic water	Test hydrostatically at 150 PSI for two (2) hours or at 1.5 times the working pressure when working pressure exceeds 100 PSI
Indirect waste	Maintain 10 ft. head of water for two (2) hours.

**END OF SECTION**

**SECTION 22 11 00  
WATER SUPPLY**

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**PART 1 - GENERAL**

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**1.1 WORK INCLUDED**

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

**1.2 QUALITY ASSURANCE**

- A. Follow all requirements, recommendations and appendices to comply with the following publications, codes, standards, and listings/approvals:
1. New York State Health Department.
  2. Local municipality and fire department requirements and standards.
  3. All items here-in used to convey water for potable use shall be lead free in accordance with NSF 61, Standard 61, Section 9 - Standard for Drinking Water and Lavatory Faucets and NSF Standard 372 - Maximum Lead Requirements. Compliance shall be via third party testing and certification.

**1.3 SUBMITTALS**

- A. Provide submittals for all items specified under Part 2 of this Section.

**PART 2 - PRODUCTS**

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**2.1 WATER PIPING**

- A. Piping Materials: Refer to Specification Section 221010 "Piping Systems and Accessories".

**2.2 BACKFLOW PREVENTERS AND ACCESSORIES**

- A. Reduced Pressure Type (Domestic Water - 2 in. and Smaller):
1. All bronze body construction, stainless steel bolts and internal parts, stainless steel check seats.
  2. Four (4) test cocks, bronze strainer and full port ball valve shutoffs.
  3. Design Equipment: Watts Series 909.
  4. Acceptable Manufacturers: Ames, Febco, Wilkins, Watts.
- B. Reduced Pressure Type (Domestic Water - 2-1/2 in. and Larger):
1. Cast iron body, stainless steel bolts and internal parts, removable bronze seats, epoxy coated, bronze relief valve.
  2. Four (4) test cocks, epoxy-coated strainer, OS&Y resilient wedge gate valves.
  3. Design Equipment: Watts Series 909.
  4. Acceptable Manufacturers: Ames, Febco, Wilkins, Watts.

- C. Dual Check Type with Intermediate Atmospheric Vent (Coffee and Ice Machines):
  - 1. Conforms to NSF Standard No. 25, stainless steel body, threaded end connections, rubber diaphragm, ball check, vent extended to drain.
  - 2. Design Equipment: Watts #9BD.
  - 3. Acceptable Manufacturers: Conbraco, Febco, Watts, Zurn.
- D. Dual Check with Atmospheric Vent (Beverage Machines):
  - 1. Conforms to ASSE 1022, stainless steel body, ANSI (NSF Standard 18 certified), wye pattern strainer, stainless steel springs, for continuous pressure, vent extended to drain.
  - 2. Design Equipment: Watts #SD3.
  - 3. Acceptable Manufacturers: Conbraco, Febco, Watts, Zurn.
- E. Dual Check Type (Residential Domestic Water - 1 in. and smaller):
  - 1. Conforms to ASSE Standard 1024, copper body with union ends, plastic check modules, silicone discs and BUNA-N seals, stainless steel springs, straight line flow.
  - 2. Design Equipment: Watts Series #Cu7.
  - 3. Acceptable Manufacturers: Conbraco, Febco, Watts, Zurn.
- F. Terminal Valve:
  - 1. Cast iron body with flapper valve, coated finish.
  - 2. Design Equipment: J.R. Smith, Figure #7070.
  - 3. Acceptable Manufacturers: J.R. Smith, Waterman.

## 2.3 VACUUM BREAKERS

- A. Atmospheric Type:
  - 1. Lead free brass body, silicone disc, ASSE 1001, threaded inlet and outlet connections, polished chrome for finished areas.
  - 2. Design Equipment: Watts Series #LF288-A.
  - 3. Acceptable Manufacturers: Watts, Conbraco, Zurn or approved equal.
- B. Hose Connection Type:
  - 1. Brass body, stainless steel working parts, rubber diaphragm and disc, drainable, non removable feature, polished chrome for finished areas.
  - 2. Design Equipment: Watts #LF8.
  - 3. Acceptable Manufacturers: Watts, Conbraco, Zurn or approved equal.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Coordinate work with all other trades and utility company.



- B. Inspect pipe, fittings and equipment prior to installation. Remove all defective materials from the site.
- C. Do not cover piping until inspection by Owner's Representative.
- D. Install pipe and equipment in accordance with manufacturer's recommendations and in a workmanlike manner as determined by the Owner's Representative.

### 3.2 BACKFLOW PREVENTERS

- A. The backflow preventer installation shall be installed in accordance to the Health Department approved drawings.
- B. Prior to installation of backflow preventers, obtain the approved drawings from the Engineer.
- C. Provide hub style drain for emergency relief drain with a pipe separation of at least two (2) pipe diameters from backflow preventer relief outlet.

### 3.3 PIPING

- A. Run slightly off level to low points; provide drain valves at low points. Provide shock absorbers where shown, or specified. Branch headers serving flush valves shall be full size as shown. Exposed water piping in Kitchen shall be chrome plated brass (from insulation to fixture or equipment connection.). Provide dielectric pipe fittings when connecting to piping systems of dissimilar metals. All supply piping to fixtures, faucets, hydrants and flush valves shall be anchored to prevent movement.
- B. Provide shock absorbers where flush valves and quick closing valves are used as specified in Section 223010.

### 3.4 CLEANING AND DISINFECTING

- A. Refer to Specification Section 221010, "Piping Systems and Accessories" for domestic water piping cleaning and disinfecting requirements.

### 3.5 TESTS

- A. Provide all necessary items to complete proper testing of work. Perform all testing in accordance with governing codes, local utilities and other agencies having jurisdiction and as specified. Pay all costs to perform tests. Perform all testing in a safe manner.
- B. Upon completion of construction, all backflow prevention devices provided under this contract shall be tested. Tests shall be performed by a certified backflow preventer tester registered by the New York State Department of Health. Provide three (3) copies of Form DOH-1013 for each device with Part A completed by the tester. Submit forms to Engineer. Pay all costs required for testing devices, including administrative costs associated with satisfying the requirements and regulations of Water Authority and Health Department. Repair or replace any device failing the test and repeat the test.

- C. Test each vacuum breaker according to authorities having jurisdiction and the device's reference standard.
- D. Refer to Specification Section 221010, "Piping Systems and Accessories" for pipe testing requirements.

**END OF SECTION**

**SECTION 22 13 00**  
**SANITARY, WASTE AND STORM DRAINAGE SYSTEMS**

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**PART 1 - GENERAL**

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**1.1 WORK INCLUDED**

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

**1.2 SUBMITTALS**

- A. Provide submittals for all items specified under Part 2 of this section.

**PART 2 - PRODUCTS**

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**2.1 PLUMBING DRAINAGE SYSTEM**

- A. Piping Materials: Refer to Section 221010 "Piping Systems and Accessories".

**PART 3 - EXECUTION**

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**3.1 GENERAL**

- A. Prior to commencing work, the Contractor shall verify inverts and locations. Any discrepancy between plans and field conditions shall be reported to the Owner or Engineer. No work shall start until discrepancies have been resolved. All costs related to Contractor's failure to verify and report discrepancies will be borne by the Contractor.
- B. Install pipe and equipment in accordance with manufacturer's recommendations and in a workmanlike manner as determined by the Owner's Representative.

**3.2 PIPE INSTALLATION**

- A. Minimum Pitch: 2-1/2 in. and under - 1/4 in. per ft.; 3 in. and larger - 1/8 in. per ft.
- B. In all finished spaces, paint exposed waste piping 2 in. and over with chromium paint.
- C. Slope piping as indicated on drawing; verify inverts given. Inspect piping before installation to detect apparent defects. Remove defective piping from site. Lay piping beginning at low point of system, true to grades and alignment indicated, with unbroken continuity of invert. Install piping and gaskets in accordance with manufacturer's recommendations and other special installation requirements. Clean interior of piping of dirt and other foreign material as work progresses. Place plugs in ends of pipe at end of day or whenever work stops. Flush lines if required to remove collected debris.

- D. Inspect piping to determine whether line displacement or other damage has occurred. Make inspections after lines have been installed and approximately 2 ft. of backfill is in place, and again at completion of project. If inspection indicates poor alignment, debris, displaced pipe, infiltration, or other defects, correct such defects, and reinspect.

**3.3 TESTING**

- A. Refer to Specification Section 221010, "Piping Systems and Accessories" for pipe testing requirements.

**END OF SECTION**

**SECTION 22 30 10  
EQUIPMENT**

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**PART 1 - GENERAL**

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**1.1 WORK INCLUDED**

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Document.

**1.2 SUBMITTALS**

- A. Provide submittals for all items specified under Part 2 of this section.

**PART 2 - PRODUCTS**

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**2.1 CLEANOUTS**

- A. Floors: Cast iron body, nickel-bronze top with adjustable feature, bronze plug and flashing clamp where required, carpet marker and tile cover where applicable; Jay R. Smith Series #4028.
- B. Walls: Cast iron ferrule, with bronze plug and stainless steel smooth access cover.
1. Horizontal: Jay R. Smith Figure #4402.
  2. Vertical: Jay R. Smith Figure #4531.
- C. Make: Josam, Jay R. Smith, Wade, Watts or Zurn.

**2.2 HOSE BIBBS (INTERIOR)**

- A. Inside sill faucet, vacuum breaker, lead-free, solder connection, 3/4 in. hose thread outlet, lock shield cap, loose key control, flanged female inlet, polished chrome plate finish for finished rooms, rough chromium for unfinished rooms.
- B. Make: Woodford Model 84, Prier, Chicago Faucets or Acorn in finished room; Chicago Faucets #998 in Mechanical Rooms, Boiler Room, Penthouse, or other unfinished rooms.

**2.3 SHOCK ABSORBERS**

- A. Hydropneumatically controlled with permanently sealed expansion chamber pre-charged with non-combustible gas; lead-free, threaded connection, meets or exceeds Plumbing and Drainage Institute Standard PDI WH-201 and ASSE Standard 1010.
1. Bellows Type: Stainless steel construction with stainless steel bellows.
  2. Piston Type: Hard drawn copper body with brass piston, cap and adapter, and elastomer seals.
- B. Elastomer or rubber compound type bellows not allowed.

- C. Make: Watts #LF15M2, Precision Plumbing Products, Jay R. Smith, or Zurn.

## 2.4 WATER PRESSURE GAUGES

- A. Construction to be Bourdon tube type; 4-1/2 in. diameter, minimum dial face, stamped stainless steel, replaceable glass lens, with snap-on rings. Phosphor bronze tube, bronze bushed rotary movement, silver brazed or soldered to brass socket and brass tip, 1/4 in. bottom connection. Accuracy, on (1.0) percent of included scale range. White dial face with black numerals, graduated in pounds; equipped with bronze pulsation dampener or snubber and needle valve.
- B. Make: Trerice, Weiss, Weksler, Winters.

## 2.5 BACKFLOW PREVENTER ALARM EQUIPMENT

- A. Paddle Waterflow Detectors:
1. Adjustable retard, feature, SPDT contact, 24 volt DC, 250 psi rated.
  2. Design Equipment: Potter Electric #VSR Series or approved equal.

## PART 3 - EXECUTION

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### 3.1 EQUIPMENT CONNECTIONS

- A. Plumbing Contractor shall:
1. Provide all roughing and final water and waste connections to all equipment requiring same as called for on Contract Documents.
  2. Refer to Contract Documents for roughing schedules, and equipment and lists indicating scope of connections required.
  3. Provide loose key stops, adapters and all necessary piping and fittings from roughing point to equipment.
  4. Provide for installation of equipment provided by an Equipment Contractor. These items to be delivered, in easily identified cartons, to the proper room for Contractor's installation.
  5. Install controls and devices furnished by others.
  6. Provide cold water line with gate valve and backflow prevention device at locations called for. Continuation and connection to equipment by others.
  7. Install relief valve discharge piping from equipment relief valves.
  8. Provide for Owner furnished equipment:
    - a. Connect complete and ready for use, including all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, insulation, sheet metal work, controls, dampers, etc., as required by Owner.
    - b. Refer to manufacturer Drawings and Specifications for requirements of special equipment. Verify connection requirements before bidding.

**3.2 CLEANOUTS**

- A. Install cleanouts out of traffic patterns and flush to floor. Provide offset from sanitary line served. Do not locate under doors or under lockers. Maintain distance between cleanouts on piping 4 in. and smaller, 50 ft.; over 4 in., 100 ft. At changes in direction greater than 45°. Install at base of soil, waste, vent, stacks and roof conductors and where called for.
- B. Cleanouts: Same nominal size as pipe, but not larger than 4 in.

**3.3 HOSE BIBBS**

- A. Install at low points of piping system.

**3.4 SHOCK ABSORBERS**

- A. Install in vertical position.

**3.5 PRESSURE GAUGES**

- A. Provide in piping system where called for and shown, with needle valve and pulsation damper or snubber at each location. Arrange to be easily read from the floor.
- B. Select range such that the maximum system working temperature is in the middle one-third of the scale.

**END OF SECTION**

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**SECTION 23 05 00****BASIC HVAC REQUIREMENTS**

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**PART 1 - GENERAL**

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**1.1 WORK INCLUDED**

- A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these contract documents. All materials and equipment shall be installed in accordance with the manufacturer's recommendations.

**1.2 LICENSING**

- A. The Contractor shall hold a license to perform the work as issued by the authority having jurisdiction.
- B. Plumbing contract work shall be performed by, or under, the direct supervision of a licensed master plumber.
- C. Electrical contract work shall be performed by, or under, the direct supervision of a licensed electrician.

**1.3 PERMITS**

- A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges. Provide certificate of approval from the Authority having jurisdiction prior to request for final payment.
- B. Provide electrical inspection certificate of approval from Middle Department Inspection Agency, Commonwealth Inspection Agency, or an Engineer approved Inspection Agency prior to request for final payment.

**1.4 CODE COMPLIANCE**

- A. Provide work in compliance with the following:
  - 1. Building Code of New York State.
  - 2. Mechanical Code of New York State.
  - 3. Plumbing Code of New York State.
  - 4. Fire Code of New York State.
  - 5. Energy Conservation Construction Code of New York State.
  - 6. New York State Department of Labor Rules and Regulations.
  - 7. New York State Department of Health.
  - 8. National Electrical Code (NEC).

9. Occupational Safety and Health Administration (OSHA).
10. Local Codes and Ordinances.
11. Life Safety Codes, NFPA 101.
12. Town of Evans Plumbing Department.

## 1.5 GLOSSARY

ACI	American Concrete Institute
AGA	American Gas Association
AGCA	Associated General Contractors of America, Inc.
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AFBMA	Anti-Friction Bearing Manufacturer's Association
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASTM	American Society for Testing Materials
AWSC	American Welding Society Code
AWWA	American Water Works Association
FM	Factory Mutual Insurance Company
IBR	Institute of Boiler & Radiation Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NYS/DEC	New York State Department of Environmental Conservation
SBI	Steel Boiler Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UFPO	Underground Facilities Protective Organization
UL	Underwriter's Laboratories, Inc.

OSHA Occupational Safety and Health Administration  
 XL - GAP XL Global Asset Protection Services

## 1.6 DEFINITIONS

Acceptance	Owner acceptance of the project from Contractor upon certification by Engineer.
As Specified	Materials, equipment including the execution specified/shown in the contract documents.
Basis of Design	Equipment, materials, installation, etc. on which the design is based. (Refer to the article, Equipment Arrangements, and the article, Substitutions.)
Code Requirements	Minimum requirements.
Concealed	Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
Coordination Drawings	Show the relationship and integration of different construction elements and trades that require careful coordination during fabrication or installation, to fit in the space provided or to function as intended.
Delegated-Design Services	(Performance and Design criteria for Contractor provided professional services). Where professional design services or certifications by a design professional are specifically required of a Contractor, by the Contract Documents. Provide products and systems with the specific design criteria indicated.  If criteria indicated is insufficient to perform services or certification required, submit a written request for additional information to the Engineer.  Submit wet signed and sealed certification by the responsible design professional for each product and system specifically assigned to the Contractor to be designed or certified by a design professional.  Examples: structural maintenance ladders, stairs and platforms, pipe anchors, seismic compliant system, wind, structural supports for material equipment, sprinkler hydraulic calculations.
Equal, Equivalent, Equal To, Equivalent To, As Directed and As Required	Shall all be interpreted and should be taken to mean "to the satisfaction of the Engineer".
Exposed	Work not identified as concealed.
Extract	Carefully dismantle and store where directed by Engineer and/or reinstall as indicated on drawings or as described in specifications.
Furnish	Purchase and deliver to job site, location as directed by the Engineer.
Inspection	Visual observations by Engineer.

Install	Store at job site if required, proper placement within building construction including miscellaneous items needed to affect placement as required and protect during construction. Take responsibility to mount, connect, start-up and make fully functional.
Labeled	Refers to classification by a standards agency.
Manufacturers	Refer to the article, Equipment Arrangements, and the article, Substitutions.
Prime Professional	Engineer having a contract directly with the Owner for professional services.
Product Data	Illustrations, standard schedules, performance charts, instructions, brochures, wiring diagrams, finishes, or other information furnished by the Contractor to illustrate materials or equipment for some portion of the work.
Provide (Furnish and Install)	Contractor shall furnish all labor, materials, equipment and supplies necessary to install and place in operating condition, unless otherwise specifically stated.
Relocate	Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.
Remove	Dismantle and take away from premises without added cost to Owner, and dispose of in a legal manner.
Review and Reviewed	Should be taken to mean to be followed by "for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents".
Roughing	Pipe, duct, conduit, equipment layout and installation.
Samples	Physical full scale examples which illustrate materials, finishes, coatings, equipment or workmanship, and establishes standards by which work will be judged.
Satisfactory	As specified in contract documents.
Shop Drawings	Fabrication drawings, diagrams, schedules and other instruments, specifically prepared for the work by the Contractor or a Sub-contractor, manufacturer, supplier or distributor to illustrate some portion of the work.
Site Representative	Engineer at the work site.
Submittals Defined (Technical)	Any item required to be delivered to the Engineer for review as requirement of the Contract Documents.  The purpose of technical submittals is to demonstrate for those portions of the work for which a submittal is required, the manner in which the Contractor proposes to conform to the information given and design concepts expressed and required by the Contract Documents.

**1.7 SHOP DRAWINGS/PRODUCT DATA/SAMPLES**

- A. Refer to Section 013300 - Shop Drawing Procedures for requirements.

**1.8 PROTECTION OF PERSONS AND PROPERTY**

- A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

**1.9 EQUIPMENT ARRANGEMENTS**

- A. The contract documents are prepared using one manufacturer as the Basis of Design, even though other manufacturers' names are listed. If Contractor elects to use one of the listed manufacturers other than Basis of Design, submit detailed drawings, indicating proposed installation of equipment. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in the work of other trades, at no cost to the Owner. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace doorframes, access doors, walls, ceilings, or floors required to install other than Basis of Design. If revised arrangement submittal is rejected, revise and resubmit specified Basis of Design item which conforms to Contract Documents.

**1.10 SUBSTITUTIONS**

- A. See Section 012500 - Substitution Procedures for requirements.

**1.11 CONTINUITY OF SERVICES**

- A. The building will be in use during construction operations. Maintain existing systems in operation within all rooms of building at all times. Refer to "General Conditions of the Contract for Construction" for temporary facilities for additional contract requirements. Schedules for various phases of contract work shall be coordinated with all other trades and with Owner's Representative. Provide, as part of contract, temporary mechanical and electrical connections and relocations as required to accomplish the above. Obtain approval in writing as to date, time, and location for shutdown of existing mechanical/electrical facilities or services.
- B. Refer to Section 013113 - Coordination with Owner's Operations for additional requirements.

**1.12 ROUGHING**

- A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.

- B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of the contract to accommodate obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. **DO NOT SCALE** plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Engineer for review. Obtain written approval for all major changes before installing.
- C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.
- D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Engineer exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, and other items.
- E. Before roughing for equipment furnished by Owner or in other contracts, obtain from Owner and other Contractors, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:
  - 1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.
  - 2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Engineer.

### 1.13 REMOVAL WORK

- A. Where existing equipment removals are called for, submit complete list to Engineer. All items that Owner wishes to retain that do not contain asbestos or PCB Material shall be delivered to location directed by Owner. Items that Owner does not wish to retain shall be removed from site and legally disposed of. Removal and disposal of material containing asbestos, lead paint, mercury and PCB's shall be in accordance with Federal, State and Local law requirements. Where equipment is called for to be relocated, contractor shall carefully remove, clean and recondition, then reinstall. Remove all abandoned piping, wiring, equipment, lighting, ductwork, tubing, supports, fixtures, etc. Visit each room, crawl spaces, and roofs to determine total Scope of Work. The disturbance or dislocation of asbestos-containing materials causes asbestos fibers to be released into the building's atmosphere, thereby

creating a health hazard to workmen and building occupants. Consistent with Industrial Code Rule 56 and the content of recognized asbestos-control work, the Contractor shall apprise all of his workers, supervisory personnel, subcontractors, Owner and Engineer who will be at the job site of the seriousness of the hazard and of proper safeguards and work procedures which must be followed, as described in New York State Department of Labor Industrial Code Rule 56.

- B. For materials indicated to contain lead, that are being affected by demolition or construction, the contractor shall be in accordance with all Federal, State and Local law requirements regarding worker exposure to lead disturbance and abatement procedures.
- C. Refer to the Owner's Lead Paint Survey. The Survey identifies the surfaces within the buildings that were tested for lead by collecting paint samples and performing laboratory analysis. If any unidentified surfaces are to be impacted the lead content shall be tested by analytical determinations conducted by a qualified laboratory approved by the Owner. The contractor shall review the current owner's lead paint reports on file before starting any work which may disturb existing surfaces.

#### 1.14 REFRIGERANT RECOVERY

- A. Existing equipment to be removed, as shown on the plans may contain refrigerant and refrigerant oils. This refrigerant and refrigerant oil must be handled in accordance with Federal, State and Local law requirements.
- B. Removal and recovery of refrigerant shall be in accordance with the current edition of Section 608 of the Clean Air Act of 1990, including all final regulations.
- C. Refrigerant recovery must be performed by a technician, certified by an EPA-approved certification program, using refrigerant recovery and recycling equipment certified by an EPA-approved testing organization.
- D. Owner "reserves the right of first refusal" on ownership of recovered refrigerant. Should Owner choose to maintain ownership of refrigerant, refrigerant shall be reclaimed, cleaned by this Contractor to ARI 700-1993 Standard of Purity, by an EPA certified refrigerant reclaimer. Refrigerant shall be turned over to the Owner in suitable marked containers to be stored on site, at a place of the Owner's choosing.

#### 1.15 EQUIPMENT AND MATERIAL INSTALLATION

- A. Provide materials that meet the following minimum requirements:
  1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
  2. All equipment and material for which there is a listing service shall bear a UL label.
  3. Potable water systems and equipment shall be built according to AWWA and NSF Standards.
  4. Electrical equipment and systems shall meet UL Standards and requirements of the NEC.

- B. Exterior and wet locations shall utilize materials, equipment supports, mounting, etc. suitable for the intended locations. Metals shall be stainless steel, galvanized or with baked enamel finish as a minimum. Finishes and coatings shall be continuous and any surface damaged or cut ends shall be field corrected in accordance with the manufacturer's recommendations. Hardware (screws, bolts, nuts, washers, supports, fasteners, etc.) shall be:
1. Stainless steel where the associated system or equipment material is stainless steel or aluminum.
  2. Hot dipped galvanized or stainless steel where the associated system or equipment is steel, galvanized steel or other.

### 1.16 CUTTING AND PATCHING

- A. Each trade shall include their required cutting and patching work unless otherwise shown. Refer to General Conditions for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate spalling. Patch cut or abandoned holes left by removals of equipment or fixtures. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

### 1.17 PAINTING

- A. Paint all insulated and bare piping, pipe hangers and supports exposed to view in mechanical equipment rooms, penthouse, boiler rooms and similar spaces. Paint all bare piping, ductwork and supports exposed to the out-of-doors. Paint all equipment that is not factory finish painted (i.e. expansion tanks, etc.).
- B. All painting shall be in accordance with Section 099100 - Field Painting. All surfaces must be thoroughly cleaned before painting. Review system color coding prior to painting with the Engineer or Architect.
- C. All items installed after finished painting is completed and any damaged factory finish paint on equipment furnished under this contract must be touched up by the Contractor responsible for same.
- D. Include painting for patchwork with color to match adjacent surfaces. Where color cannot be adequately matched, paint entire surface.
- E. All primers and paint used in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.
- F. Color coding of piping shall comply with the Ten States Standards.



**1.18 EXISTING CEILING REMOVAL AND RE-INSTALLATION**

- A. In a renovation project, any existing ceiling removal and re-installation work required for the completion of a Contractors or Subcontractors work, shall be removed and re-installed by that Contractor or Subcontractor. This applies in any areas not called for to have a new ceiling installed.
- B. The ceiling removal and re-installation shall include lay-in ceiling tile and grid, to the extent necessary to accomplish the work. Removed ceiling tile and grid shall be safely stored during the course of the work, and it shall be re-installed to the original existing condition.
- C. The ceiling removal and re-installation shall include gypsum board or plaster ceilings and the associated suspension systems. Removed ceiling areas shall be patched with materials to match the existing ceiling, and painted to match. If paint cannot be matched exactly, paint the entire ceiling a similar color.

**1.19 CONCEALMENT**

- A. Conceal all contract work above ceilings and in walls, below slabs, and elsewhere in finished areas of the buildings. If concealment is impossible or impractical, notify Engineer before starting that part of the work and install only after his review. In areas with no ceilings, install only after Engineer reviews and comments on arrangement and appearance.

**1.20 CHASES**

- A. In Existing Buildings:
  - 1. Drill holes for floor and/or roof slab openings.
  - 2. Multiple pipes smaller than 1 in. properly spaced and supported may pass through one 6 in. or smaller diameter opening.
  - 3. Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge galvanized sleeves at fire rated assemblies. Extend sleeves 2 in. above floors.
  - 4. In wall openings, drill or cut holes to suit. Provide 18 gauge galvanized sleeves at shafts and fire rated assemblies. Provide fire-stopping seal between sleeves and wall in drywall construction. Provide fire stopping similar to that for floor openings.

**1.21 PENETRATION FIRESTOPPING**

- A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:
  - 1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.

2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.
6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.
7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.

**B. Acceptable Manufacturers:**

1. Dow Corning Fire-Stop System Foams and Sealants.
2. Nelson Electric Fire-Stop System Putty, CLK and WRP.
3. S-100 FS500/600, Thomas & Betts.
4. Carborundum Fyre Putty.
5. 3-M Fire Products.
6. Hilti Corporation.

## 1.22 NON-RATED WALL PENETRATIONS

- A. Each trade shall be responsible for sealing wall penetrations related to their installed work, including but not limited to ductwork, piping, conduits, etc. See individual specification sections for requirements.

## 1.23 SUPPORTS

- A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. For precast panels/planks and metal decks, support mechanical/electrical work as determined by manufacturer and the Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.
- B. Equipment, piping, conduit, raceway, etc. supports shall be installed to minimize the generation and transmission of vibration.
- C. Materials and equipment shall be solely supported by the building structure and connected framing.

**1.24 HVAC EQUIPMENT CONNECTIONS**

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Provide final hot water, drain and vent connections to all equipment as required by the equipment. Provide final connections, including domestic water piping, wiring, controls, and devices from equipment to outlets left by other trades. Provide equipment waste, drip, overflow and drain connections extended to floor drains.
- C. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, insulation, sheet metal work, controls, dampers, as required.
- D. Refer to manufacturer drawings and specifications for requirements of special equipment. Verify connection requirements before bidding.

**1.25 PLUMBING EQUIPMENT CONNECTIONS**

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Provide roughing and final water and indirect waste connections to all equipment. Provide loose key stops, adapters, and all necessary piping and fittings from roughing point to equipment. Provide installation of equipment furnished by others. Provide cold water line with gate valve and backflow prevention device at locations called for. Provide continuation of piping and connection to equipment that is furnished by others. Provide relief valve discharge piping from equipment relief valves.
- C. Provide valved water outlet adjacent to equipment requiring same. Provide equipment type floor drains, or drain hubs, adjacent to equipment.
- D. Install controls and devices furnished by others.
- E. Refer to Contract Documents for roughing schedules, and equipment and lists indicating scope of connections required.
- F. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, pressure reducing valves, gauges, relief valves, vents, drains, as required.
- G. Refer to Manufacturer drawings and specifications for requirements of special equipment. Verify connection requirements before bidding.

**1.26 ELECTRICAL EQUIPMENT CONNECTIONS**

- A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Provide heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.
- B. Provide for Owner furnished and Contractor furnished equipment all power wiring, electric equipment, control wiring, switches, lights, receptacles, and connections as required.
- C. Refer to Manufacturer's drawings/specifications for requirements of special equipment. Verify connection requirements before bidding.

**1.27 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT**

- A. Store Materials on dry base, at least 6 in. aboveground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.
- B. Refer to Section 016600 - Product Storage and Handling Requirements for additional information.
- C. The Contractor shall provide airtight plastic covers over all supply and return air openings prior to the start of construction. The plastic shall be maintained airtight throughout the project construction and removed only with the approval of the Engineer.

**1.28 FREEZING AND WATER DAMAGE**

- A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner.

**1.29 OWNER INSTRUCTIONS**

- A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

**1.30 OPERATION AND MAINTENANCE MANUALS**

- A. Refer to Section 017823 - Operation and Maintenance Data for requirements.

**1.31 RECORD DRAWINGS**

- A. Refer to Section 017840 - Record Documents for requirements.

**1.32 TEMPORARY HEATING AND COOLING**

- A. Systems and equipment installed as part of this project shall not be used for temporary heating or cooling.

**1.33 TEMPORARY FACILITIES**

- A. Refer to the Division 1 Sections, General Conditions and Supplementary Conditions.

**1.34 TEMPORARY LIGHT AND POWER**

- A. Refer to the Division 1 Sections, General Conditions and Supplementary Conditions.

**1.35 CLEANING**

- A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:
  1. Thoroughly clean entire installation, both exposed surfaces and interiors.
  2. Remove all debris caused by work.
  3. Remove tools, surplus, materials, when work is finally accepted.

**1.36 SYSTEM START-UP AND TESTING**

- A. Prior to commencement of work, the Contractor(s) affecting such system shall survey all building electrical systems and components, including fire alarm, intrusion, communications, clock and computer; make written notice to the Owner regarding existing damages, missing items and incomplete systems. Prior to the conclusion of this project, the Contractor shall verify with the Engineer that all building system has been returned to their original conditions.
- B. The Contractor shall be responsible for providing temporary filter media over all supply air registers and diffusers during the HVAC system start-up procedure. The Contractor shall provide airtight plastic covers over all supply and return air openings prior to the start of construction. The plastic shall be maintained airtight throughout the project construction and removed only with the approval of the Engineer.

**1.37 ENERGY INCENTIVES**

- A. The Contractor, his Subcontractors and Suppliers shall provide to the Owner all paperwork necessary to support the Owners pursuit of incentives related to energy conservation as provided by NYSEERDA. This shall include at a minimum receipts for energy efficient equipment such as: lighting, motors, variable frequency drives, etc.

**1.38 INFECTION CONTROL**

- A. Construction procedures, temporary partitions, negative air systems, cleaning procedures, HVAC system isolation, dust control, etc. shall be in accordance with the infection control standards set forth by the Facility. A copy of the facilities standards are available from the Owner upon request.

**END OF SECTION**

**SECTION 23 05 04  
ELECTRIC WIRING**

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**PART 1 - GENERAL**

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**1.1 WORK INCLUDED**

- A. Provide labor, materials, equipment and services for the complete installation of motor control wiring and temperature control wiring as required in Contract Documents. Provide wiring and conduit, required to connect devices furnished as part of or adjunctive to the automatic temperature control system and for motor control regardless of the source of supply. Control wiring includes 120 volt and lower voltage wiring for control signals directing equipment operation. Control circuits shall be 120 volt maximum. Provide wiring in accordance with requirements specified in Division 26, "Electrical" and the National Electrical Code. Provide devices required for proper system operation, including special electrical switches, transformers, disconnect switches, relays, and circuit breaker protection.
- B. Coordinate all work with Division 26, "Electrical".

**1.2 WORK NOT INCLUDED**

- A. Power wiring for motors, motor starters and associated starting and control equipment, as well as the motor starters (except in the case of equipment specified to have packaged control/starters), are included in Division 26, "Electrical", unless otherwise called for.

**1.3 QUALIFICATIONS**

- A. Wiring shall be installed in compliance with all requirements of Division 26, "Electrical".

**1.4 SUBMITTALS**

- A. Provide complete wiring diagrams for equipment systems. Deliver wiring diagrams to proper trades in time for roughing of conduit, equipment connections, and avoid delay in construction schedule. Wiring diagrams and roughing information to be wired as part of the Work of Division 26, "Electrical", shall be clearly indicated.

**PART 2 - PRODUCTS**

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**2.1 PRODUCTS**

- A. Refer to Division 26 specifications for required wiring materials.

## **PART 3 - EXECUTION**

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### **3.1 GENERAL**

- A. Check electrical wiring pertaining to equipment for completeness and correctness of connections. Correct any misapplied motor and/or motor starter, improper thermal overload device, or device which fails to function and resultant damage, whether due to incorrect connections or improper information on wiring diagrams.

### **3.2 WIRING FOR CONTROL SYSTEMS**

- A. Provide motor control and temperature control wiring for equipment. All wiring shall be in conduit, unless otherwise noted. Refer to Section 260501 for type of conduit to be used in specific applications. Provide 18 in. length flexible conduit at motors and devices subject to vibration. Conduit supported on 5 ft. centers. Do not attach directly to hot surfaces, piping, or ductwork. Control wiring shall be in separate conduit from all other wiring. Provide green grounding wire circuited from starter, and run ground wire through conduit to each remote auxiliary relay, pushbutton station, remote panel heating device, thermostat, or device with potentials in excess of 50 volts. Size ground wire as required by NEC.
- B. All temperature control wiring shall be plenum rated type, meeting the requirements of NEC Article 300.
- C. Provide pushbutton stations, pilot lights, selector switches, auxiliary starter contacts, and other devices required to provide specified functions.
- D. Where allowable by Code and contract documents, temperature control wiring may be installed without conduit. Installation and wire insulation types shall be as described by NEC, Article 725. All low voltage wiring circuits 50 volt and under shall:
  - 1. Be adequately supported using bridle rings spaced a maximum of 3 ft. on centers or other approved method when installed horizontally above accessible ceilings or run exposed in unfinished areas.
  - 2. Be installed in conduit when run in wall cavity or surface metal raceway where no access is available to wall cavity, in finished areas.
  - 3. Be installed in conduit when installed vertically in Mechanical/Utility Rooms from panels and devices up to above ceiling, or 10 ft. above finished floor if not ceiling.
  - 4. Be installed in conduit in all cases not specifically covered by the above cases, or where subject to physical damage.

### **3.3 EQUIPMENT WIRING**

- A. Provide power and control wiring between sections of electrical radiation units, between shipping splits, and between remote panels, thermostats, disconnect switches, and their respective units. Provide control wiring from the package control system, to each respective electric heat coil, reheat coil or motor. Properly mount control package. Power wiring to and including disconnect switch shall be by Division 26 "Electrical".



**3.4 FIELD WIRING IN STARTERS, CONTROLLERS AND PANELS**

- A. Wiring within starters, controllers, and temperature control panels, shall be routed neatly in gutter space, away from moving and/or heat producing parts. Provide suitably rated terminal blocks. Do not place more than two wire connections on pilot device or relay terminal. Where more than two circuit connections are required, use terminal blocks. Provide nylon insulated, ring spade terminal for all control wires. Cables and wires shall be neatly bundled and lashed with nylon cable straps.

**END OF SECTION**

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## SECTION 23 05 13 MOTORS

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### PART 1 - GENERAL

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#### 1.1 DESCRIPTION

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

#### 1.2 SUBMITTALS

- A. Submit manufacturer's product data on all motors.
- B. Product Data: For each motor, provide dimensions; mounting arrangements; frame type, enclosure type, location for conduit entries; shipping and operating weights; and manufacturer's technical data on features, performance, electrical ratings and characteristics.
- C. Motor Performance Data: For each motor, include the following manufacturers' data:
  - 1. Motor Performance: Percent Efficiency, Power Factor, Torque, RPM, Duty Rating and Design Category.

#### 1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  - 1. Motor manufacturer shall be based and headquartered in the United States of America and shall design and manufacture motors in the United States.
  - 2. Motor manufacturer shall have over fifteen (15) years-experience in the motor industry and shall maintain active company-wide quality assurance program.
  - 3. Motor manufacturer shall maintain an authorized service center within 60 miles of the project site, capable of providing training, parts and emergency maintenance and repairs.
- B. Motor performance shall be warranted against material and workmanship defects by manufacturers limited warranty and service policy for the period of at least 18 months from the day of shipment from the factory or the manufacturer's warehouse.
  - 1. Premium efficiency motors shall be warranted for 36 months.
  - 2. Severe duty motors (as applicable) shall be warranted for 60 months.
  - 3. Extended warranty shall be offered for certain products or as agreed by additional terms and specified elsewhere.

## PART 2 - PRODUCTS

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### 2.1 MOTORS

#### A. General Requirements:

1. Motors built for 60 Hz operation, three phase for 1/2 HP and larger; single phase for 1/3 HP and smaller.
  - a. In compliance with NEMA Standards, wound specifically for nameplate voltage, and selected for appropriate duty and environment.
  - b. 1.15 minimum service factor at rated voltage and frequency.
  - c. Bearings: Bearings shall have a rated fatigue life of L-10 (B-10) of 150,000 hours for direct-coupled applications and 50,000 hours for belted applications minimum. Belted rating shall be based on radial loads and pulley sizes called out in NEMA MG 1-14.43. The calculation will be determined from the pulley centerline being at the end of the motor shaft.
  - d. V-belt connected motors with adjustable slide rail bases and pulleys.
  - e. Motors shall have Class F insulation system, with Class B temperature rise, insulation meeting NEMA MG 1 Part 31. Maximum allowable motor temperature rise for open drip-proof or totally enclosed fan cooled (TEFC) type at 1.15 service factor shall be 105°C above 40°C ambient with a total temperature rating of 155°C.
  - f. NEMA locked rotor kVA code as required to match unit equipment torque characteristics.
  - g. Single-phase motors shall be capacitor start, induction run, or split phase type.
  - h. Polyphase motors shall be constant speed, squirrel cage, unless otherwise specified.
  - i. Nameplates shall have as a minimum, all information as described in NEMA Standard MG-1-20.60. Motor nameplate shall be mounted on enclosure with stainless steel fastening pins.
2. Motors for use with adjustable speed drive applications shall be premium efficiency inverter duty rated in accordance with NEMA and be capable of a 20:1 turndown.
  - a. These motors shall meet NEMA corona inception voltage requirements, withstanding peak voltages up to 1600 volts, and be manufactured in accordance with NEMA MG 1 Part 30 and 31.
  - b. All motors controlled by adjustable speed drives shall be equipped with circumferential micro-fiber shaft grounding rings to provide protection from electrical bearing damage, to meet NEMA MG 1, 31.4.4.3. Provide AEGIS Bearing Protection Ring Kit (or equal), installed in accordance with the manufacturer's recommendation.

3. Three phase motors rated 1 HP and greater shall be copper winding, re-lubable ball bearings, 1.15 service factor, premium efficiency, energy-saver type with a guaranteed NEMA nominal full-load efficiency, by IEEE Standard 112 Test Method "B". Efficiency rating shall appear on nameplate, and shall be not less than as follows; per NEMA MG 1 Part 12, Table 12-12, nominal minimum efficiencies:

MINIMUM NOMINAL FULL-LOAD MOTOR EFFICIENCY						
HP	ODP MOTORS (RPM)			TEFC MOTORS (RPM)		
	1200	1800	3600	1200	1800	3600
1.0	82.5	85.5	77	82.5	85.5	77.0
1.5	86.5	86.5	84	87.5	86.5	84
2.0	87.5	86.5	85.5	88.5	86.5	85.5
3.0	88.5	89.5	85.5	89.5	89.5	86.5

4. Nominal Motor Voltage Table:

Nominal System Voltage	Motor Nameplate
480V - 3 phase	460 volt
240V - 1 phase and 3 phase	230 volt
208V - 1 phase and 3 phase	200 volt
120V - 1 phase	115 volt

5. Motor Application; Provide the following enclosure types unless noted otherwise:

Environment/Location	Motor Enclosure Type
General Purpose	Open drip-proof, TEFC with cast iron frame, or encapsulated
Outdoors, below grade or high humidity	TEFC with cast iron frame
Hazardous	Explosion-proof
Packaged Refrigeration Compressors	Hermetic or semi-hermetic

6. Acceptable Manufacturers: Motors need not all be of the same manufacturer. Subject to the requirements of this section provide products by the following:

- a. General Electric Energy & Saver NEMA Premium Efficiency/(ODP); General Electric X\$D Ultra NEMA Premium Efficiency (TEFC).
- b. Century/A.O. Smith Speed Plus
- c. Baldor-Reliance Super E.
- d. Lincoln Ultimate E CTAC.
- e. Marathon XRI.
- f. Siemens GO100A.
- g. Nidec Motor Co. (U.S. Motors) Premium Efficient.



**PART 3 - EXECUTION**

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**3.1 MOTORS**

- A. Furnished by equipment manufacturer and especially manufactured and/or selected, mounted, and installed for intended use. Install motors accessible for maintenance and belt adjustment.

**3.2 REPLACEMENT OF EXISTING MOTORS**

- A. Verify motor characteristics, including voltage, shaft length, speed, rotation, horsepower and frame type, and provide motors as called for. Modify or replace existing motor mounts and bases to accommodate the replacement motors.

**END OF SECTION**

**SECTION 23 05 19**  
**GAUGES AND THERMOMETERS**

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**PART 1 - GENERAL**

---

**1.1 WORK INCLUDED**

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

**1.2 SUBMITTAL**

- A. Submit product data for gauges, thermometers and thermowells.

**PART 2 - PRODUCTS**

---

**2.1 WATER PRESSURE GAUGES**

- A. Construction to be Bourdon tube type; 4-1/2 in. diameter minimum, dial face, stamped stainless steel, replaceable glass lens, with snap-on rings. Phosphor bronze tube, bronze bushed rotary movement, silver brazed or soldered to brass socket and brass tip. 1/4 in. bottom connection. Accuracy, one (1.0) percent of included scale range. White dial face with black numerals, graduated in pounds; equipped with bronze pulsation dampener or snubber.
- B. Make: American, Ashcroft, Crosby, Duro, Marsh, Moeller, Terrice, Weiss, Weksler, Winters.

**2.2 PIPING SYSTEM THERMOMETERS**

- A. Industrial type, plastic, aluminum or steel case, glass or plastic front, non-toxic organic liquid filled, red reading column, white or silver V-shaped scale, black numerals. Union flange mounted, separable socket with thermowell, extension necks where required; range as called for service. Universal adjustable type, 9 in. scale. For installation in hot water systems, graduations of 2°F., accurate to within 1°F. For installation in water systems where the maximum temperature is less than 120°F, graduations of 1°F, accurate to within 1/2°F.
- B. Make: American, Moeller, Terrice, Weiss, Weksler, Winters.

**2.3 PRESSURE/TEMPERATURE TEST PLUGS**

- A. 1/4 in. NPT plug shall be capable of reading either a pressure or temperature. 1/8 in. o.d. dual seal core of Nordel 275°F with zero leakage from vacuum to 500 psig.
- B. Makes: Peterson Equipment Company, Sisco P/T plugs.

## **PART 3 - EXECUTION**

---

### **3.1 GENERAL**

- A. Provide where called for in the drawings and as noted below.
- B. All gauges and thermometers shall be provided with pressure and temperature ranges appropriate for the system in which they are installed. Select to operate in the middle third of the range under normal operating conditions. Gauges and thermometers shall be suitable for the environment of their installed location, and if installed outdoors shall be acceptable for operation down to an ambient temperature of -20 degrees F.

### **3.2 WATER PRESSURE GAUGES**

- A. Heating water coils: 0 to 60 psi range.
- B. Provide 1/4 in. ball valve in each pump inlet and outlet tapping, or in piping adjacent to same. Range 30 in. vacuum to 100 psi.

### **3.3 THERMOMETERS**

- A. Provide thermowells mounted in oversize tee, or elbow if necessary, to provide as little restriction as possible to fluid flow. Provide thermometer stems and thermowell depths of proper length to allow accurate reading. Locate adjacent to control sensing equipment. Install and adjust angles so as to be easily read from floor.
- B. Heating Coil: Inlet and outlet; range 0° to 220°F.

### **3.4 TEST PLUG**

- A. Provide test plugs at locations as called for.

END OF SECTION



**SECTION 23 05 23  
VALVES**

---

**PART 1 - GENERAL**

---

**1.1 WORK INCLUDED**

- A. Provide labor, materials, equipment and services as required for the complete installation and related Work designed in Contract Documents.

**1.2 SUBMITTAL**

- A. Submit product data for valves and accessories.

**PART 2 - PRODUCTS**

---

**2.1 VALVES**

- A. General: Valves shall have following requirements:
1. Working pressure stamped or cast on bodies.
  2. Stem packing serviceable without removing valve from line.
  3. Valves on insulated services shall have handle extensions so that the handle is fully beyond the insulation jacketing.
  4. Where possible, all valves of like type shall be of a single manufacturer.
- B. Acceptable Manufacturers:
1. Check Valves: Apollo, Hammond, Milwaukee, Nibco, Watts.
  2. Ball Valves: Apollo, Hammond, Jamesbury, Milwaukee, Watts, Nibco.
  3. To establish a standard of quality and to identify features, certain manufacturer's numbers are given in the following paragraphs.
- C. Check Valves:
1. 2 in. and Smaller: Bronze, swing check, threaded ends, 125 SWP, Milwaukee 509.
- D. Ball Valves for Water Service:
1. For hot water systems 3 in. and under: Bronze body with hardened chrome-plated brass ball, glass reinforced or carbon impregnated PTFE seats, full porting, 600 lb., W.O.G., adjustable packing gland, insulated handle, screwed or soldered ends, blowout proof stem. Provide handle extension on insulated services.

- E. Valves for Gauges and Instruments:
  - 1. 1/4 in., bronze body, hardened chrome plated brass ball, glass reinforced carbon impregnated seats, standard porting, 400 lb. W.O.G., adjustable packing gland, screwed ends, tee handle, Watts B6000TH.
- F. Hose Thread Drain Valves:
  - 1. Ball valve, bronze body, hardened chrome ball with hose thread end, cap and chain.

**PART 3 - EXECUTION**

---

**3.1 INSTALLATION**

- A. General:
  - 1. Provide valves of type called for and where required to service equipment.
  - 2. Locate valves with handles at horizontal position when 5 ft. or more above the floor, for greater visibility and easier use. Otherwise, locate valves with handles at or above horizontal position. Swing check valves in upright position only.
  - 3. Ball valves may be used for water service through 3 in., unless otherwise noted.
  - 4. Provide hose threaded valves at low points, strainers, equipment, and as called for.

**END OF SECTION**

**SECTION 23 05 30  
ROOF CURBS**

---

**PART 1 - GENERAL**

---

**1.1 DESCRIPTION**

- A. Provide labor, materials, equipment and services as required for the complete installation of roof curbs as shown in Contract Documents.

**1.2 SUBMITTALS**

- A. Typical detail and schedule for equipment. Details shall include cross-sectional view illustrating clearly the type of curb being submitted, i.e. double wall insulated, with or without cant.

**PART 2 - PRODUCTS**

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**2.1 ROOF CURBS AND PIPE/DUCT/EQUIPMENT SUPPORTS**

- A. Basis of Design: Subject to compliance with requirements of this section, provide Roof Products and Systems Corp. (RPS) or comparable product by one of the following:
1. RPI (Roof Products Inc.)
  2. ThyCurb
  3. Greenheck
- B. Configuration: Coordinate curb type with roof deck construction and insulation thickness.
1. Self-flashing without cant strip, with mounting flange. (RPS Series 2A)
  2. Built-in cant and mounting flange (RPS Series 3A).
  3. Built-in raised cant and mounting flange. (RPS Series 4A).

**2.2 FAN CURBS/DUCT CURBS**

- A. Double wall, 1-1/2 in. minimum thickness, with wood blocking, fully insulated in the interior cavity with rigid insulation. Curb constructed of galvanized steel, 1-1/2 in. 3# density insulation with continuous welded corner seams and painted at all welds. 20 gauge up to 36 in., 18 gauge 38 to 72 in., 16 gauge over 72 in. in any dimension.
- B. Provide curb with adhesive backed closed cell foam gasket on the top edge to make airtight seal between curb and ventilator, fan, or air handling unit.
- C. Options:
1. Wind certified design.

D. Basis of Design: RPS - RC Roof Curbs.

**PART 3 - EXECUTION**

---

**3.1 GENERAL**

A. Height as recommended by equipment manufacturer, not less than described in this specification. This Contractor shall be responsible for exact size, length, and location and shall set and secure each curb to the roof. Shim and level curb as required. Provide curb and supports for all roof-mounted equipment. All roof penetrations shall be made through an appropriate curb. All roof mounted equipment including fans, air handling units, etc, shall be set on an equipment support unless otherwise noted. Refer to Contract Drawings for details on plenums extending from curbs.

**END OF SECTION**



**SECTION 23 05 50**  
**WIND RESTRAINT FOR HVAC SYSTEMS**

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**PART 1 - GENERAL**

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**1.1 SECTION INCLUDES**

- A. Support and brace mechanical and electrical systems, as called for, to resist directional wind forces (lateral, longitudinal and vertical).

**1.2 APPLICABLE CODES AND STANDARDS**

- A. Provide work in compliance with the following codes and standards:
- B. Building Code of New York State, Section 1609.
- C. Mechanical Code of New York, Section 301.
- D. American Society of Civil Engineers (ASCE) Minimum Design Loads for Buildings and Other Structures - Standard ASCE/SEI 7-05.

**1.3 QUALITY ASSURANCE**

- A. General:
  - 1. The contractor shall provide professional engineer stamped and signed calculations, and details of wind restraint systems to meet total design lateral force requirements for support and restraint of mechanical and electrical systems.
  - 2. Systems requiring wind restraint:
    - a. Make-up air handling units
    - b. Roof exhaust fans.

**1.4 SUBMITTALS**

- A. Submit wind force level ( $F_p$ ) calculations from applicable building code. Submit pre-approved restraint selections, installation details, and plans indicating locations of restraints.
- B. Calculations, plans, restraint selection, and installation details shall be stamped and signed by a professionally licensed engineer experienced in wind restraint design.
- C. Submit manufacturer's product data.
- D. For each piece of equipment that requires wind restraint as outlined in this section, include the following:
  - 1. Dimensioned Outline Drawings of Equipment Unit: Identify the center of gravity and locate and describe mounting and anchoring provisions.

2. Anchorage: Provide detailed description of equipment anchorage devices on which the calculations are based and their installation requirements. Identify anchor bolts, studs and other mounting devices. Provide information on the size, type and spacing of mounting brackets, holes and other provisions.

## PART 2 - PRODUCTS

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### 2.1 CODE INFORMATION

- A. This project is subject to the wind bracing requirements of the Building Code of New York State, International Building Code and American Society of Civil Engineers ASCE 7. The following criteria are applicable to this project:
  1. Basic Wind Speed (V) (Per ASCE 7-05): **90 mph.**
  2. Importance Factor (I) (Per ASCE 7-05): **1.00.**
  3. Exposure Category (Per ASCE 7-05): **B**
  4. Height and Exposure Adjustment Coefficient (Per ASCE 7-05): **N/A - Building height is greater than 60 ft.**
  5. The mean height of the structure ( $h_{MEAN}$ ) shall be determined thru coordination with Architectural plans and the General Contractor.

### 2.2 WIND BRACING AND SUPPORT OF SYSTEMS AND COMPONENTS

- A. General:
  1. Design analysis shall include calculated dead loads, wind loads, and capacity of materials utilized for the connection of the equipment or system to the structure.
  2. Analysis shall detail anchoring methods, bolt diameter, and embedment depth.
  3. All wind restraint devices shall be designed to accept without failure the forces calculated per the applicable building code and as summarized in Section 2.1.
- B. Friction from gravity loads shall not be considered resistance to wind forces.

## PART 3 - EXECUTION

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### 3.1 INSTALLATION

- A. Wind Restraint of Electrical Services:
  1. All restraint systems shall be installed in strict accordance with the manufacturer's restraint guidelines manual and all certified data.
  2. Installation of restraints shall not cause any change in position of equipment or piping, resulting in stresses or misalignment.
  3. No rigid connections between equipment and the building structure shall be made that degrade the noise and vibration-isolation system specified.

4. Do not install any equipment, piping, duct, or conduit that makes rigid connections with the building unless isolation is not specified.
5. Prior to installation, bring to the Architect's/Engineer's attention any discrepancies between the specifications and the field conditions, or changes required due to specific equipment selection.
6. Bracing may occur from flanges of structural beams, upper truss cords of bar joists, cast in place inserts, or wedge-type concrete anchors. Consult Structural Engineer of record.
7. Overstressing of the building structure shall not occur from overhead support of equipment. Bracing attached to structural members may present additional stresses. The Contractor shall submit loads to the structural engineer of record for approval in this event.
8. Brace support rods when necessary to accept compressive loads. Welding of compressive braces to the vertical support rods is not acceptable.
9. Provide reinforced clevis bolts where required.
10. Do not brace a system to two independent structures such as a roof and wall.

B. Wind Restraint of Ductwork and Equipment:

1. All restraint systems shall be installed in strict accordance with the manufacturer's restraint guidelines and all certified submittal data.
2. The interaction between mechanical and electrical equipment and the supporting structures shall be designed into the restraint systems.
3. Friction clips shall not be used for anchorage attachments.
4. Expansion anchors shall not be used for non-vibration isolated equipment rated over 10 HP.
5. Components mounted on vibration isolation systems shall have a bumper restraint or snubber in each horizontal direction and vertical restraints shall be provided to resist overturning.
6. Installation of restraints shall not cause any change in position of equipment or ductwork, resulting in stresses or misalignment.
7. No rigid connections between equipment and the building structure shall be made that degrade the noise and vibration-isolation system specified.
8. Do not install any equipment or duct that makes rigid connections with the building unless isolation is not specified.
9. Prior to installation, bring to the Architect's/Engineer's attention any discrepancies between the specifications and the field conditions, or changes required due to specific equipment selection.
10. Bracing may occur from flanges of structural beams, upper truss cords of bar joists, cast in place inserts, or wedge-type concrete anchors. Consult Structural Engineer of record.
11. Overstressing of the building structure shall not occur from overhead support of equipment. Bracing attached to structural members may present additional stresses. The Contractor shall submit loads to the Structural Engineer of record for approval in this event.
12. Brace support rods when necessary to accept compressive loads. Welding of compressive braces to the vertical support rods is not acceptable.
13. Provide reinforced clevis bolts where required.
14. Do not brace a system to two independent structures such as a roof and wall.

**END OF SECTION**

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**SECTION 23 05 53  
MECHANICAL IDENTIFICATION**

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**PART 1 - GENERAL**

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**1.1 WORK INCLUDED**

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

**1.2 QUALIFICATION**

- A. All identification devices shall comply with ANSI A13.1 for lettering size, length of color field, colors and viewing angles.

**1.3 SUBMITTALS**

- A. Submit manufacturer's technical product data and installation instructions for each identification material and device. Submit valve schedule for each piping system typewritten on an 8-1/2 in. x 11in. (Minimum) indicating valve number, location, and valve function. Submit schedule of pipe, equipment and name identification for review before stenciling or labeling.

**1.4 MAKES**

- A. Allen Systems, Inc.; Brady (W.H.) Co.; Signmark Div.; Industrial Safety Supply Co., Inc.; Seton Name Plate Corp.

**PART 2 - PRODUCTS**

---

**2.1 GENERAL**

- A. Provide manufacturer's standard products of categories and types required for each application. In cases where this is more than one type specified for an application, selection is installer's option, but provide single selection for each product category.
- B. All adhesives used for labels in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits as called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.
- C. For work within an existing building, the mechanical identification shall meet the intent of this section, but match the Owner's existing identification symbology.

**2.2 PIPING IDENTIFICATION**

- A. Identification Types:
1. Pressure Sensitive Type: Provide manufacturer's standard pre-printed, permanent adhesive, color coded, pressure sensitive vinyl pipe markers complying with ANSI A13.1. Provide a 360° wrap of flow arrow tape at each end of pipe label.

2. Snap-On Type: Provide manufacturer's standard pre-printed, semi-rigid snap-on, color coded pipe markers, complying with ANSI A13.1.

B. Lettering:

1. Piping labeling shall conform to the following list:

Pipe Function	Identification
Heating Water Supply	HWS
Heating Water Return	HWR

**2.3 VALVE IDENTIFICATION**

A. Valve Tags:

1. Standard brass valve tags, 2 in. diameter with 1/2 in. high numerals. Identify between heating and plumbing services with 1/4 in. letters above the valve number. Lettering to be stamped and in-filled black. Seton, or equal.
  - a. Valve-tag Fasteners: Brass wire-link or beaded chain; or S-hook.

**2.4 EQUIPMENT LABELS**

A. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, phenolic (micarta) labels for mechanical engraving, 1/8 in. thick, and having predrilled holes for attachment hardware.
2. Letter Color: White.
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 in.
6. Minimum Letter Size: 1/4 in. for name of units if viewing distance is less than 24 in., 1/2 in. for viewing distances up to 72 in., and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number.

C. Provide for the following equipment:

1. Rooftop make-up air units
2. Pumps
3. Exhaust fans
4. Unit heaters

**PART 3 - EXECUTION**

---

**3.1 GENERAL**

- A. Provide valve tags for all valves provided on project, except for service valves at terminal equipment.
- B. Provide equipment tags for all equipment listed above.
- C. Provide piping identification with directional flow arrows for all piping on project, at maximum intervals of 20 feet. For piping installed through rooms, provide at least one pipe label in each room, for each pipe function.

**END OF SECTION**

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**SECTION 23 05 93**  
**TESTING, ADJUSTING AND BALANCING**

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**PART 1 - GENERAL**

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**1.1 WORK INCLUDED**

- A. Provide labor, materials, equipment and services to perform operations required for complete adjusting and balancing Work as required in Contract Documents.
- B. This Section specifies the requirements and procedures of, mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.
- C. Test, adjust, and balance the following mechanical systems:
  - 1. Supply air systems, all pressure ranges; including constant volume and variable volume systems.
  - 2. Exhaust air systems.
  - 3. Hydronic systems; including constant flow and variable flow systems.
- D. This Section does not include:
  - 1. Specifications for materials for patching mechanical systems;
  - 2. Specifications for materials and installation of adjusting and balancing devices. If devices must be added to achieve proper adjusting and balancing, refer to the respective system sections for materials and installation requirements.
  - 3. Requirements and procedures for piping and ductwork systems leakage tests.

**1.2 SUBMITTALS**

- A. Provide information in report form listing items required by specifications. Results shall be guaranteed. Contractor shall be subject to recall to site to verify report information before acceptance of the report by the Owner's Representative.
- B. Certified report format shall consist of the following:
  - 1. Title sheet with job name, contractor, engineer, date, balance contractor's name, address, telephone number and contact person's name and the balancing technician's name.
  - 2. Individual test sheets for air handlers, terminal units, air distribution, exhaust fans, duct traverses, pumps, air handling coils, reheat coils and unit heaters.
  - 3. Manufacturer's pump and fan curves for equipment installed with design and actual operating conditions indicated.

4. One complete set of reproducible record contract drawings or single line sketch of system marked up with terminal unit numbers, room numbers, testports locations, register, grille and diffuser numbers to correlate test sheet. Data shall be provided with reports.
5. TAB Report Forms: Use standard forms from AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems." or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems".

### 1.3 DEFINITIONS

- A. System testing, adjusting and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes:
  1. The balance of air and water distribution;
  2. Adjustment of total system to provide design quantities;
  3. Electrical measurement;
  4. Verification of performance of all equipment and automatic controls.
- B. Test: To determine quantitative performance of equipment.
- C. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment (e.g., reduce fan speed, throttling).
- D. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.
- E. Procedure: Standardized approach and execution of sequence of work operations to yield reproducible results.
- F. Report Forms: Test data sheets arranged for collecting test data in logical order for submission and review. This data should also form the permanent record to be used as the basis for required future testing, adjusting, and balancing.
- G. Terminal: The point where the controlled fluid enters or leaves the distribution system. There are supply inlets on water terminals, supply outlets on air terminals, return outlets on water terminals, and exhaust or return supply or outside air inlets or outlets on terminals such as registers, grilles, diffusers, and louvers.
- H. Main: Duct or pipe containing the system's major or entire fluid flow.
- I. Submain: Duct or pipe containing part of the systems' capacity and serving two or more branch mains.
- J. Branch Main: Duct or pipe serving two or more terminals.
- K. Branch: Duct or pipe serving a single terminal.

#### 1.4 QUALIFICATIONS

- A. Follow procedures and methods published by one or more of the following:
  - 1. Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB).
  - 2. Individual manufacturer requirements and recommendations.
- B. Maintain qualified personnel at project for system operation and trouble shooting. TAB contractor shall change sheaves and perform mechanical adjustments in conjunction with balancing procedure.
- C. Balancing contractor shall be current member of AABC or NEBB.
- D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in the *AABC National Standards for Total System Balance*.

#### 1.5 GENERAL REQUIREMENTS

- A. Before concealment of systems visit the job site to verify and advise on type and location of balancing devices and test points. Make changes as required to balance facilities.
- B. Place systems in satisfactory operating condition.
  - 1. Adjusting and balancing shall be accomplished as soon as the systems are complete and before Owner takes possession.
  - 2. Prior to balancing, adjust balancing devices for full flow; fill, vent and clean hydronic systems, replace temporary filters and strainers.
  - 3. Initial adjustment and balancing to quantities as called for or as directed by the engineer, to satisfy job conditions.
  - 4. All outdoor conditions (Db, Wb, and a description of the weather conditions) at the time of testing shall be documented in the report.
  - 5. Provide sheaves and belts as required to meet system performance requirements for all belt-driven fan motors 10 HP and greater. Adjust and align sheaves to obtain proper settings and operation. Verify motors are not overloading.
  - 6. Installing contractor shall replace balancing cocks, flow balancers and dampers in new systems that cannot be manipulated to satisfy balancing requirements.
  - 7. Identify flow balancers, balancing cocks and dampers in existing systems that cannot be manipulated to satisfy balancing requirements.
  - 8. Traverse main ducts to determine total system air quantities after all outlets have been set prior to final adjustment if the system does not meet design requirements. A sum of room CFM's is not acceptable.
  - 9. If duct construction and/or installation prohibits proper traverse readings, provide coil measurements at main coils and/or fresh air intake traverse with units operating in 100% outside air mode (where applicable).

## 1.6 CONTRACTOR RESPONSIBILITIES

- A. Provide Testing and Balancing agency one complete set of contract documents, change orders, and approved submittals in digital and hard copy formats.
- B. Controls contractor shall provide required BAS hardware, software, personnel and assistance to Testing and Balancing agency as required to balance the systems. Controls Contractor shall also provide trending report to demonstrate that systems are complete.
- C. Coordinate meetings and assistance from suppliers and contractors as required by Testing and Balancing agency.
- D. Provide additional valves, dampers, sheaves and belts as required by Testing and Balancing agency.
- E. Flag all manual volume dampers with fluorescent or other high-visibility tape.
- F. Provide access to all dampers, valves, test ports, nameplates and other appurtenances as required by Testing and Balancing agency.
- G. Installing contractor shall replace or repair insulation as required by Testing and Balancing agency.
- H. Have the HVAC systems at complete operational readiness for Testing and Balancing to begin. As a minimum verify the following:
  - 1. Airside:
    - a. All ductwork is complete with all terminals installed.
    - b. All volume, smoke and fire dampers are open and functional.
    - c. Clean filters are installed.
    - d. All fans are operating, free of vibration, and rotating in correct direction.
    - e. ASD start-up is complete and all safeties are verified.
    - f. System readiness checklists are completed and returned to Testing and Balancing agency.
  - 2. Hydronics:
    - a. Piping is complete with all terminals installed.
    - b. Water treatment is complete.
    - c. Systems are flushed, filled and air purged.
    - d. Strainers are pulled and cleaned.
    - e. Control valves are functioning per the sequence of operation.
    - f. All shutoff and balance valves have been verified to be 100% open.
    - g. Pumps are started, and proper rotation is verified.
    - h. Pump gauge connections are installed directly at the pump inlet and outlet flange or in discharge and suction pipe prior to any valves or strainers.



- i. System readiness checklists are completed and returned to Testing and Balancing agency.
- I. Promptly correct deficiencies identified during Testing and Balancing.
- J. Maintain a construction schedule that allows the Testing and Balancing agency to complete work prior to occupancy.

## **PART 2 - PRODUCTS**

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### **2.1 GENERAL REQUIREMENTS**

- A. Provide tools, ladders, recording meters, gauges, thermometers, velometers, anemometers, Pitot tubes, inclined gauge manometers, magnehelic gauges, amprobes, voltmeters, psychrometers and tachometers required.
- B. Instrumentation Calibration: Calibrate instruments at least every six (6) months or more frequently if required by instrument manufacturer.
  - 1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.

## **PART 3 - EXECUTION**

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### **3.1 PREPARATION**

- A. Examine Bid Documents and submittals and notify Owner's Representative and Engineer of any questions regarding balancing.
  - 1. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper Testing and Balancing of systems and equipment.
  - 2. Examine the approved submittals for HVAC systems and equipment.
  - 3. Examine equipment performance data including fan and pump curves.
- B. Prepare a Testing and Balancing Strategies and Procedures Plan that includes:
  - 1. Equipment and systems to be tested.
  - 2. Strategies and step-by-step procedures for balancing the systems.
  - 3. Instrumentation to be used.
  - 4. Sample forms with specific identification for all equipment.
- C. Prepare system-readiness checklists, as described in the *AABC National Standards for Total System Balance*, for use by contractors in verifying system readiness for Testing and Balancing. These shall include, at a minimum:
  - 1. Airside:
    - a. All ductwork is complete with all terminals installed.
    - b. All volume, smoke and fire dampers are open and functional.
    - c. Clean filters are installed.

- d. All fans are operating, free of vibration, and rotating in correct direction.
  - e. Permanent electrical power wiring and ASD start-up is complete and all safeties are verified.
  - f. Automatic temperature-control systems are operational.
  - g. Ceilings are installed.
  - h. Windows and doors are installed.
  - i. Suitable access to balancing devices and equipment is provided.
  - j. Equipment and duct access doors are securely closed.
2. Hydronics:
- a. Piping is complete with all terminals installed.
  - b. Water treatment is complete.
  - c. Systems are flushed, filled and air purged.
  - d. Strainers are pulled and cleaned.
  - e. Control valves are functioning per the sequence of operation.
  - f. All shutoff and balance valves have been verified to be 100% open.
  - g. Pumps are started and proper rotation is verified.
  - h. Pump gauge connections are installed directly at the pump inlet and outlet flange or in discharge and suction pipe prior to any valves or strainers.
  - i. Permanent electrical power wiring is complete and all safeties are verified.
  - j. Suitable access to balancing devices and equipment is provided.
- D. Examine construction and notify Owner's Representative and Engineer of outstanding issues related to balancing, as part of "Examination Report" submittal.
- 1. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas.
  - 2. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, clean permanent filters are installed, and controls are ready for operation.
  - 3. Examine strainers to verify that Mechanical Contractor has replaced startup screens with permanent screens and that all strainers have been cleaned.
  - 4. Examine two-way valves for proper installation and function.
  - 5. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
  - 6. Examine air vents to verify that mechanical contractor has removed all air from all hydronic systems.
  - 7. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, weld-o-lets, and manual volume dampers prior to pressure testing. Note the locations of devices that are not accessible for testing and balancing.

### 3.2 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.
- C. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

### 3.3 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- D. Check airflow patterns from the outside-air louvers and dampers and the return and exhaust-air dampers, through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and function.
- J. Check for proper sealing of air-handling unit components.
- K. Check for proper sealing of air duct system.

### 3.4 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
1. Measure fan static pressures to determine actual static pressure as follows:
    - a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
    - b. Measure static pressure directly at the fan outlet or through the flexible connection.
    - c. Measure inlet static pressure of single-inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
    - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
  2. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and treating equipment.
    - a. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.
  3. Measure static pressures entering and leaving other devices such as sound traps, heat recovery equipment, and air washers, under final balanced conditions.
  4. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Compare actual system affect factors to identify where variations occur. Recommend corrective action to align design and actual conditions.
  5. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Make required adjustments to sheaves sizes, motor sizes, and electrical connections to accommodate fan-speed changes.
  6. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full cooling, full heating, economizer, and any other operating modes to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
    - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

2. Re-measure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure terminal outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust terminal outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using volume dampers rather than extractors and the dampers at air terminals.
1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
  2. Adjust patterns of adjustable outlets for proper distribution without drafts.

### 3.5 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare test reports for pumps and coils. Obtain approved submittals and any manufacturer-recommended testing procedures. Cross check the summation of required coil gpm's with pump design flow rate.
- B. Verify that hydronic systems are ready for testing and balancing:
1. Check liquid level in expansion tank and verify that tank is set to specified pressure for system fill and expansion.
  2. Check that makeup water has adequate pressure to highest vent.
  3. Check that control valves are in their proper positions.
  4. Check that air has been purged from the system.
  5. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
  6. Verify that motor starters are equipped with properly sized thermal protection.

### 3.6 PROCEDURES FOR CONSTANT-FLOW HYDRONIC SYSTEMS

- A. Adjust pumps to deliver total design gpm.
1. Measure total water flow.
    - a. Position valves for full flow through coils.
    - b. Measure flow by main flow meter, if installed.
    - c. If main flow meter is not installed, determine flow by pump total dynamic head (TDH) or exchanger pressure drop.
  2. Measure pump TDH as follows:
    - a. Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves or fittings.

- b. Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
  - c. Convert pressure to head and correct for differences in gauge heights.
  - d. On single stage centrifugal pumps, verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
  - e. With all valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.
3. Monitor motor performance during procedures and do not operate motor in an overloaded condition.
- B. Adjust flow measuring devices installed in branches to design water flows.
- 1. Measure flow in main and branch pipes.
  - 2. Adjust branch balance valves for design flow.
- C. Adjust flow measuring devices installed at terminals for each space to design water flows.
- 1. Adjust each terminal to design flow.
- D. Verify final system conditions as follows:
- 1. Re-measure and confirm that total water flow is within design.
  - 2. Re-measure all final pump operating data, TDH, volts, amps, static profile.
  - 3. Mark all final settings.
- E. Verify that all memory stops have been set.

### 3.7 TOLERANCES

- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
- 1. Supply, Return, and Exhaust Fans: Zero to plus 10 percent.
  - 2. Air Outlets and Inlets: Plus or minus 10 percent.
  - 3. Minimum Outside Air: Zero to plus 10 percent.
  - 4. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.
  - 5. Heating-Water Flow Rate: Plus or minus 10 percent.

### 3.8 FINAL TEST AND BALANCE REPORT

- A. The report shall be a complete record of the HVAC system performance, including conditions of operation, items outstanding, and any deviations found during the Testing and Balancing process. The final report also provides a reference of actual operating conditions for the owner and/or operations personnel. All measurements and test results that appear in the reports must be made on site and dated by the technicians or Test and Balance Engineers.

B. The report must be organized by systems and shall include the following information as a minimum:

1. Title Page:

- a. AABC or NEBB Certified Company Name.
- b. Company Address.
- c. Company Telephone Number.
- d. Project Identification Number.
- e. Location.
- f. Project Architect.
- g. Project Engineer.
- h. Project Contractor.
- i. Project Number.
- j. Date of Report.
- k. Certification Statement.
- l. Name, Signature, and Certification Number.

2. Table of Contents.

3. National Performance Guaranty.

4. Report Summary:

- a. The summary shall include a list of items that do not meet design tolerances, with information that may be considered in resolving deficiencies.

5. Instrument List:

- a. Type
- b. Manufacturer
- c. Model
- d. Serial Number
- e. Calibration Date

C. Required air side data - Test, adjust and record the following:

1. Motors:

- a. RPM
- b. BHP
- c. Full load amps
- d. Sheave sizes, number and size of belts
- e. Shaft diameter
- f. Complete nameplate data

2. Fans:

- a. Cfm
- b. RPM
- c. Suction static pressure
- d. Discharge static pressure

- e. Sheave sizes, number and size of belts, key sizes, shaft, diameter
  - f. Complete nameplate data
  - g. Sketch of system's inlet and outlet connections
  - h. Location of test port
3. Duct: Traverse Zones
- a. Cfm
  - b. Static Pressure
4. AHU - (In both low and high speed modes):
- a. Static profile thru unit
  - b. Complete nameplate data
5. Coil:
- a. Entering air temperature (DB/WB)
  - b. Leaving air temperature (DB/WB)
  - c. Static differential
  - d. Face velocity and area
  - e. Cfm
  - f. Complete nameplate data
6. Filter Banks:
- a. Nameplate data
  - b. Static pressure drop
- D. Required Fluid Data: Test, adjust and record the following:
1. Heat Transfer Devices: Including, but not limited to, unit heaters, heat pumps, heat exchangers.
- a. GPM (coil and bypass)
  - b. Entering water temperature
  - c. Leaving water temperature
  - d. Water pressure drop
  - e. Complete nameplate data
2. Pumps:
- a. Check rotation
  - b. GPM
  - c. Pump off pressures (suction and discharge)
  - d. Running suction pressure
  - e. Running discharge pressure
  - f. Running load amps
  - g. RPM - motor
  - h. Complete nameplate motor and pump
  - i. Marked up pump curve illustrating final operating conditions



- E. One (1) copy of the final test and balance report shall be sent directly to the Engineer of Record. Provide five (5) additional copies to the Contractor.

**END OF SECTION**

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**SECTION 23 07 10  
INSULATION**

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**PART 1 - GENERAL**

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**1.1 WORK INCLUDED**

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

**1.2 SUBMITTAL**

- A. Submit product data, product description, manufacturer's installation instructions, types and recommended thicknesses for each application, and location of materials.

**1.3 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 232010 - Piping Systems and Accessories.

**PART 2 - PRODUCTS**

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**2.1 GENERAL**

- A. Insulation, jackets, adhesive, and coatings shall comply with the following:
1. Treatment of jackets or facing for flame and smoke safety must be permanent. Water-soluble treatments not permitted.
  2. Insulation, including finishes and adhesives on the exterior surfaces of ducts, pipes, and equipment, shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, when tested in accordance with ASTM E84.
  3. Asbestos or asbestos bearing materials are prohibited.
  4. Comply with 2012 International Energy Conservation Code as amended by Chapter 2 of the 2014 Supplement to the New York State Energy Conservation Code, titled "Amendments to the 2012 IECC".
  5. All adhesives, coatings and sealants used for insulation in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits as called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.
  6. Provide materials which are the standard products of manufacturers regularly engaged in the manufacture of such products and that essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Provide insulation systems in accordance with the approved MICA or NAIMA Insulation Standards.
  7. Insulation shall be clearly marked with manufacturer's name, identification of installed thermal resistance (R) value, out-of-package R value, flame spread and smoke developed indexes in accordance with Energy Code requirements.

## 2.2 ACCEPTABLE MANUFACTURERS

- A. Fiberglass: Knauf, Manville, Owen-Corning, Certainteed. (Board, Blanket and Liner)
- B. Adhesives, Coatings, Mastics, Sealants: Childers, Foster.

## 2.3 PIPE INSULATION (RIGID FIBERGLASS TYPE)

- A. Glass Fiber: Knauf 1000248 Pipe Insulation meeting ASTM C 547, ASTM C 585, and ASTM C 795; rigid, molded, noncombustible.
- B. 'K' Value: ASTM C 335, 0.23 at 75°F mean temperature installed value. Maximum Service Temperature: 1000°F.
- C. Vapor Retarder Jacket: ASJ/SSL conforming to ASTM C 1136 Type I, secured with self-sealing longitudinal laps and butt strips.
- D. Field-Applied PVC Fitting Covers with Flexible Fiberglass Insulation: Proto Corporation 25/50 or Indoor/Outdoor, UV-resistant fittings, jacketing and accessories, white or colored. Fitting cover system consists of pre-molded, high-impact PVC materials with blanket type fiberglass wrap inserts. Blanket fiberglass wrap inserts shall have a thermal conductivity ('K') of 0.26 at 75°F mean temperature. Closures to be stainless steel tacks, matching PVC tape, or PVC adhesive per manufacturer's recommendations.
- E. Prefabricated Thermal Insulating Fitting Covers: Comply with ASTM C 450 for dimensions used in pre-forming insulation to cover valves, elbows, tees, and flanges.

## 2.4 FIELD-APPLIED JACKETS

- A. Piping:
  - 1. PVC Pipe Jacket: High-impact, ultraviolet-resistant PVC; 20 mils thick; roll stock ready for shop or field cutting and forming. Adhesive: As recommended by insulation material manufacturer. PVC Jacket Color: White.

## 2.5 COATINGS, MASTICS, ADHESIVES AND SEALANTS

- A. Fiberglass Adhesive: Used bond low density fibrous insulation to metal surfaces. Shall meet ASTM C916 Type II. Foster 85-60; Childers CP-127, or approved equal.
- B. Insulation Joint Sealant: Used as a vapor sealant on below ambient piping with polyisocyanurate and cellular glass insulation. Foster 95-50; Childers CP-76, or approved equal.

## 2.6 MATERIALS AND SCHEDULES

- A. See Exhibits at the end of this section.

## PART 3 - EXECUTION

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### 3.1 GENERAL REQUIREMENTS

- A. All materials shall be installed by skilled labor regularly engaged in this type of work. All materials shall be installed in strict accordance with manufacturer's recommendations, building codes, and industry standards.
- B. Locate insulation and cover seams in the least visible location. All surface finishes shall be extended in such a manner as to protect all raw edges, ends and surfaces of insulation. No glass fibers shall be exposed to the air.
- C. Provide thermal insulation on clean, dry surfaces and after piping has been tested. Do not cover pipe joints with insulation until required tests are completed.
- D. Provide protective insulation as required to prevent personnel injury: Piping from zero to seven feet above all floors and access platforms including hot (above 140°F) piping and any other related hot surface.
- E. All pipes shall be individually insulated.
- F. If any insulation material has become wet because of transit or job site exposure to moisture or water, the contractor shall not install such material, and shall remove it from the job site.

### 3.2 PIPE INSULATION

- A. Insulate piping systems including fittings, valves, flanges, unions, strainers, and other attachments installed in piping system, whether exposed or concealed.
- B. Hanger Shields: Refer to Section "Piping Systems and Accessories".
- C. Metal shields shall be installed between hangers or supports and the piping insulation. Rigid insulation inserts shall be installed as required between the pipe and the insulation shields. Inserts shall be of equal thickness to the adjacent insulation and shall be vapor sealed as required.
  - 1. Pre-Insulated Type: Butt insulation to hanger shields and apply a wet coat of vapor barrier cement to the joints and seal with 3 in. wide vapor barrier tape.
  - 2. Field Insulated Type: Provide Hamfab Co. "H" blocks per manufacturers recommended spacing between pipe and shield.
  - 3. Tape shields to insulation.
- D. Joints in section pipe covering made as follows:
  - 1. All ends must be firmly butted and secured with appropriate butt-strip material. On high-temperature piping, double layering with staggered joints may be appropriate. When double layering, the inner layer should not be jacketed.

- 2. Standard: Longitudinal laps and butt joint sealing strips cemented with white vapor barrier coating, or factory supplied pressure sensitive adhesive lap seal.
  - 3. Vapor Barrier: For cold services, Longitudinal laps and 4 in. vapor barrier strip at butt joints shall be sealed with white vapor barrier coating. Seal ends of pipe insulation at valves, flanges, and fittings with white vapor barrier coating. When using polyisocyanurate or cellular glass on below ambient piping/duct, seal all insulation joints with insulation joint sealant.
- E. Fittings, Valves and Flanges:
- 1. Hot Services Water: Premolded fitting insulation of the same material and thickness as the adjacent pipe insulation.
  - 2. White PVC jacketing, with continuous solvent weld of all seams. Tape all fittings.
- F. Apply PVC jacket where indicated, with 1 in. overlap at longitudinal seams and end joints. Seal with manufacturers recommended adhesive.
- G. Apply PVC jacketing to exposed insulated pipe, valves, fittings, and specialties, at an elevation of 8 feet or less above finished floor in mechanical/electrical rooms, penthouses, and services aisles/pipe chases.

**3.3 EXISTING INSULATION**

- A. Patch existing insulation damaged during the course of the work.

**EXHIBIT "I" - PIPE INSULATION MATERIALS**

<b><u>SERVICE</u></b>	<b><u>INSULATION MATERIAL</u></b>	<b><u>THICKNESS</u></b>	<b><u>REMARKS</u></b>
Hot water and glycol/hot water (200°F and lower)	Glass fiber	1-1/2 in. and Larger: 2 in. 1-1/4 in. and Smaller: 1-1/2 in.	

**END OF SECTION**

**SECTION 23 20 10**  
**PIPING SYSTEMS AND ACCESSORIES**

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**PART 1 - GENERAL**

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**1.1 WORK INCLUDED**

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

**1.2 SUBMITTALS**

- A. Schedule of pipe materials, fittings and connections.

**PART 2 - PRODUCTS**

---

**2.1 GENERAL**

- A. Pipe and fittings shall be new, marked with manufacturer's name and comply with applicable ASTM and ANSI Standards.
- B. All adhesives, sealants, primers and paint used for piping in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.

**2.2 STEEL PIPING AND FITTINGS**

- A. Pipe: ASTM A53, Schedule 40 weight; black or galvanized finish as called for; ends chamfered for welding or roll grooved for grooved mechanical; connections.
- B. Fittings: Same material and pressure class as adjoining pipe.
1. Welded Fittings: Factory forged, seamless construction, butt weld type, chamfered ends. Where branch connections are two or more sizes smaller than main size, use of "Weldolets", "Thredolets", or "Socoklets" are acceptable. Socket weld type, 2000 psi wp, where required.
  2. Threaded Fittings: Cast or malleable iron, black or galvanized, as required; drainage type where called for.
  3. Shop Fabricated Connections and Fittings:
    - a. Shop Fabricated Branch Connections: Fabricated branch connections constructed in strict conformance to the appropriate ASME B 31 Code of Construction may be acceptable as reviewed by the Engineer. All fabricated connections shall be constructed under controlled shop conditions using automated equipment. Calculations for all fabricated connections demonstrating conformance to ASME code and project design criteria shall be prepared and submitted for acceptance prior to fabrication. Certified welding procedures, shop quality control procedures and certifications of welders and inspectors shall be submitted to the Engineer prior to fabrication.

- C. Flanges, Unions and Couplings:
1. Threaded Connections:
    - a. Flanges: Cast iron companion type; for sizes 2-1/2 in. and larger.
    - b. Unions: Malleable iron, bronze to iron seat, 300 lb. wwp; for sizes 2 in. and smaller.
    - c. Couplings: Malleable iron, 150 or 300 lb. wwp, based on system pressure. Steel thread protectors are not acceptable as couplings.
  2. Welded Connections:
    - a. Flanges: Welding neck type.
    - b. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Gauge and Instrument Connections: Nipples and plugs for adapting gauges and instruments to piping system shall be IPS brass.

### 2.3 COPPER TUBE AND FITTINGS - SOLDER JOINT

- A. Pipe: ASTM B88; Type K, L or M, hard temper. Soft temper only where specified. Plans show copper tube sizes.
- B. Tees, Elbows, Reducers: Wrought copper, ANSI B16.22 or cast bronze; ANSI B16.8 solder end connections.
- C. Unions and Flanges: 2 in. and smaller use unions, solder type, cast bronze, ground joint, 150 lb. swp; 2-1/2 in. and over use flanges, cast bronze, companion type, ASME drilled, solder connection, 150 lb. swp.
- D. Solder Materials: No-lead solder, using alloys made from tin, copper, silver and nickel.
- E. Make: Harris "Stay-Safe 50" and "Bright", Engelhard "Silverbright 100", Willard Industries "Solder Safe (silver bearing), Canfield "Watersafe" or approved equal.

### 2.4 DIELECTRIC PIPE FITTINGS

- A. Description: Assembly or fitting having insulating material isolating joined dissimilar metals to prevent galvanic action and stop corrosion.
- B. Unions: Factory fabricated, for 250 psi minimum working pressure at 180°F, threaded or solder ends, insulating material suitable for system fluid, pressure and temperature.
- C. Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300 psig minimum pressure to suit system fluid pressures and temperatures with flange insulation kits and bolt sleeves.



- D. Waterway Fittings: 300 psi maximum working pressure at 230°F, male threaded or grooved ends, electroplated ductile iron or steel body with LTHS high temperature polyolefin polymer liner.
- E. Make: EPCO, Capitol Manufacturing, Watts, or approved equal.
- F. The use of brass valves and Shurjoint epoxy coated transition coupling IPS-CTS may be used for dielectric isolation. Dielectric transition fittings shall be Shurjoint Model DE30-GG for sizes 2 in. through 8 in., which shall provide effective insulation between the steel and copper systems to avoid galvanic local cell and stray current problems. The dielectric transition fitting shall be made of ductile iron per ASTM A536 Gr. 65-45-12, electric deposition coated, with a virgin PP (propylene) lining.

## 2.5 HANGERS, INSERTS, AND SUPPORTS

- A. Hangers, Inserts, Clamps: B-Line, Grinnell, Michigan Hanger, PHD Manufacturing, Anvil, Hilti.
- B. Hangers:
  - 1. Adjustable, wrought malleable iron or steel with electroplated zinc or cadmium finish. Copper plated or PVC coated where in contact with copper piping. Hot-dipped galvanized finish for exterior locations.
  - 2. Adjustable ring type where piping is installed directly on hanger for piping 3 in. and smaller.
  - 3. Adjustable steel clevis type for 4 in. and larger, and where insulation passes through hanger.
  - 4. Nuts, washers and rods with electroplated zinc or cadmium finish. Hot-dipped galvanized finish for exterior locations.
- C. Hanger Shields:
  - 1. Pre-Insulated Type:
    - a. Insulated pipes shall be protected at point of support by a 360° insert of high density, 100 psi waterproof calcium silicate, encased in a 180° sheet metal shield. Insulation insert to be same thickness as adjoining pipe insulation and extend 1 in. beyond sheet metal shield. Insulation shall be provided with a factory installed ASJ.
  - 2. Field-Insulated Type:
    - a. #18 USSG, galvanized steel shields, minimum 120° arc. Provide ICA-HAMFAB-BLOCK, 18# density molded fiberglass inserts, between pipe and hanger shield to maintain proper spacing for insulation. Insulation inserts shall extend 1 in. beyond the sheet metal shields. Material shall comply with ASTM E84 25/50, have a thermal conductivity of  $K=0.30$  (stable) and have a service temperature of -120°F to +650°F. Install in accordance with manufacturer's printed instructions.

3. Shield Sizing:

PIPE SIZE	SHIELD LENGTH	MINIMUM GAUGE
1/2 in. to 3-1/2 in.	9 in.	20

4. Hanger shield gauges listed are for use with band type hangers only. For point loading (roller support), increase shield thickness by one gauge, and length by 50%.

D. Hanger Spacing Schedules: (Based upon most stringent requirement of MCNYS and ASME B31.9)

COPPER OR PLASTIC PIPE SIZE	COPPER PIPE HANGER SPACING	PLASTIC PIPE HANGER SPACING	HANGER ROD SIZE
3/4 to 1 in.	6 ft.	3 ft.	3/8 in.
1-1/4 in.	6 ft.	4 ft.	3/8 in.
1-1/2 to 2 in.	8 ft.	4 ft.	3/8 in.

STEEL PIPE SIZE	STEEL PIPE HANGER SPACING	HANGER ROD SIZE
3/4 to 1 in.	8 ft.	3/8 in.
1-1/4 in.	10 ft.	3/8 in.
1-1/2 to 2-1/2 in.	12 ft.	3/8 in.

E. Inserts: Carbon steel body and square insert nut, galvanized finish, maximum loading 1,300 lbs., for 3/8 in. to 3/4 in. rod sizes. Drill through decking for hanger rods and secure devices with integral support plate strap with sheet metal screws. Devices shall have a safety factor of four.

F. Supports:

1. Provide intermediate structural steel members where required for hanger attachment. Secure member to structure. Select size of members based on a minimum factor of safety of four.
2. For Weights Under 1000 lbs.: Insert, "U" shaped channel, beam clamps or other structurally reviewed support. The factor of safety shall be at least four. Follow manufacturer's recommendations.
3. For Weights Above 1000 lbs.: Drill through floor slabs and provide flush plate welded to top of rod or provide additional inserts and hangers to reduce load per hanger below 1000 lbs.
4. Make: Hilti, ITW Ramset, Phillips "Red Head", or approved equal.

G. Trapeze Hangers:

1. For use on 1-1/2 in. and smaller piping only.
2. Hangers shall be supported with rod sized with a safety factor of four.
3. May be manufactured type "U" shaped channel, or suitable angle iron or channel. Round off all sharp edges.

4. Securely fasten piping to trapeze with "U" bolt or straps, dissimilar metals shall not touch, use isolation gaskets.
5. Make: B-Line, Kindorf, Unistrut, or approved equal.

## 2.6 SLEEVES

### A. Standard Type:

1. Schedule 40 black steel pipe sleeves shall be used for sleeves in horizontal and vertical applications through structural surfaces. Sleeves shall extend a minimum of 1 in. beyond both sides of the structure surface being penetrated. The sleeve shall be sized to account for the total diameter of the service, inclusive of insulation and the appropriate annular space for firestopping installation or requirements of the sealing element manufacturer.
2. Schedule 40, PVC sleeves or sheet metal sleeves for nonstructural surfaces and existing construction. Sheet metal sleeves shall be 18 gauge minimum and braced to prevent collapsing. Sleeves shall extend a minimum of 1/2 in. beyond both sides of the non-structural vertical surface being penetrated. The sleeve shall be sized to account for the total diameter of the service, inclusive of insulation and the appropriate annular space for firestopping.

## 2.7 SEALING ELEMENTS

### A. Expanding neoprene link type, watertight seal consisting of interlocking links with zinc plated bolts.

1. Make: Thunderline "Link-Seal" Series 200, 300 or 400, Pyropac, Calipco.

### B. Waterproof Type:

1. Exterior Walls, Below Grade, Above Floor: Synthetic rubber material with zinc plated bolts. Make: "Link-Seal" Series 200, 300 or 400, Pyropac, Calipco.

## 2.8 PIPING MATERIALS AND SCHEDULE

### A. See Exhibit "A", "Schedule of Piping Materials" at end of this Section for (HVAC) piping.

## PART 3 - EXECUTION

### 3.1 EQUIPMENT AND SYSTEMS

- #### A.
- Equipment and systems in accordance with laws, codes, and provisions of each applicable section of these specifications. Accurately establish grade and elevation of piping before setting sleeves. Install piping without springing or forcing (except where specifically called for), making proper allowance for expansion and anchoring. Arrange piping at equipment with necessary offsets, union, flanges, and valves, to allow for easy part removal and maintenance. Offset piping and change elevation as required to coordinate with other work. Avoid contact with other mechanical or electrical systems. Provide adequate means of draining and venting

units, risers, circuits and systems. Install drains consisting of a tee fitting with a 3/4 inch ball valve with hose end cap and chain, at low points in hydronic piping system mains, and elsewhere as required for system drainage.

- B. Conceal piping unless otherwise called for. Copper tubing shall be cut with a wheeled tubing cutter or other approved copper tubing cutter tool. The tubing must be cut square to permit proper joining with the fittings. Ream pipes after cutting and clean before installing. Cap or plug equipment and pipe openings during construction. Install piping parallel with lines of building, properly spaced to provide clearance for insulation. Make changes in direction and branch connections with fittings unless submitted and accepted per Part 2. Do not install valves, union and flanges in inaccessible locations. Provide trap seal of adequate depth on drain pans.
- C. Provide reducers at all control valves, where control valve is smaller than pipeline size. Reducers for steam control valves shall be eccentric type. Provide unions at each side of every control valve and reducers directly adjacent to the unions.
- D. Provide reducers at all balance valves, where balance valve is smaller than pipeline size.

### 3.2 PIPING OVER ELECTRICAL EQUIPMENT

- A. Contractor shall route piping to avoid installation directly over electric equipment, including, but not limited to panels, transformers, disconnects, starters, motor control center, adjustable speed drives and fused switches.
- B. Piping shall not be installed in the dedicated electric and working space as defined by NEC 110. Dedicated electrical space is generally equal to the depth and width of electrical equipment, and extends 6 ft. above the electrical equipment, or to a structural ceiling. Dedicated working space is a minimum of 30 in. wide or the width of equipment (whichever is larger) a minimum of 6 ft.-6 in. tall, with a depth of 3ft. to 9 ft. depending on the voltage.

### 3.3 WATER SYSTEMS

- A. Top connection for upfeed, bottom or side connection for downfeed. Grade off level; up in direction of flow and down toward drain.

### 3.4 HANGERS, INSERTS AND SUPPORTS

- A. Piping shall not be supported by wires, band iron, chains, or from other piping. Support each pipe with individual hangers from concrete inserts, welded supports, or beam clamps of proper configuration and point loading design requirements for each location including the designated safety factor. Trapeze hangers are acceptable for racking of multiple pipes of 1-1/2 in. or less in size. Follow manufacturer's safe loading recommendations. Suspend with rods of sufficient length for swing and of size as called for, using four nuts per rod. Provide additional rustproofed structural steel members, where required for proper support. Provide oversized hangers where insulation/supports must pass between pipe and hanger. Only concentric type hangers are permissible on piping larger than 2-1/2 in., "C" types are permitted for piping 2-1/2 in. and smaller. Provide riser clamps for each riser at each floor.

### 3.5 PIPE CONNECTIONS

- A. Solder Connections: Nonacid flux and clean off excess flux and solder.
- B. Threaded Connections: Clean out tapering threads, made up with pipe dope; screwed until tight connection. Pipe dope must be specific for each application.
- C. Flanged Joints: Select appropriate gasket material, size, type and thickness for service applications. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- D. Dielectric Pipe Fittings: Provide dielectric protection devices at ALL equipment connections where dissimilar metals meet. In addition, provide dielectric unions in all open type piping systems (condensing water, domestic water, etc.) where dissimilar metals are to be joined. Dielectric protection devices are not required in typical closed systems such as heating water, chilled water, heat pump loop, etc. except for the equipment connections. Dielectric protection systems are not required for air or gas systems.

### 3.6 WELDING

- A. Welding shall be performed in compliance with the welding procedure specifications prepared by the National Certified Pipe Welding Bureau. Welded pipe fabricated by certified welder. Contractor shall submit proof of current certification of each welder if requested by Owner. Use full-length pipe where possible; minimum distance between welds, 18 in. on straight runs. Welds must be at least full thickness of pipe inside smooth and remove cutting beads, slag and excess material at joints; chamfer ends. Minimum gap 1/8 in., maximum 1/4 in., for butt welds. One internal pass and one external pass minimum required on slip-on flanges. Do not apply heat to rectify distorted pipe due to concentrated welding; replace distorted pipe. When welding galvanized pipe, apply cold galvanizing on joint after welding.

### 3.7 SLEEVES

- A. Provide for pipes passing through floors, walls or ceilings.
- B. Standard Type: Provide for piping, except as called for.
- C. Extend 1/8 in. above finished areas. In above grade mechanical and other areas with floor drains; use steel pipe sleeves 2 in. above floor. Use pipe sleeves in bearing walls, structural slabs, beams and other structural surfaces, and where called for. Sleeves shall be as small as practical, consistent with insulation, so as to preserve fire rating. Fill abandoned sleeves with concrete. Provide rubber grommet seals for pipes passing through ducts or air chambers or built-up housings.

### 3.8 SLEEVE PACKING

- A. Seal void space at sleeves as follows:
  - 1. Interior Locations: Firmly pack with fiberglass and caulk.

2. Exterior Walls and Below Grade Cored Holes: Use sealing element.
3. Waterproofed Walls and Floors: Use waterproof sealing element, device, or compound.

### 3.9 TESTS

- A. Test piping and accessories before insulation, connection to existing piping or concealment. Repeat as many times as necessary to prove tight system. Notify Owner's Representative at least seven days in advance of each test. Isolate valves and equipment not capable of withstanding test pressures. Make leaks tight; no caulking permitted. Remove and replace defective fittings, pipe or connections. Furnish necessary pumps, gauges, equipment, piping, valving, power and labor for testing. Certify that tests have been successfully completed.
- B. Schedule of Test Requirements:
  1. Hot Water: Hydrostatic, 100 psig at high point of system; two (2) hours duration.
  2. Test: No change in pressure under stable temperature conditions.
  3. Equipment: Test at working pressures.

### 3.10 PIPE LINE SIZING

- A. Pipe sizes called for are to be maintained. Pipe sizing changes made only as reviewed by Owner's Representative. Where discrepancy in size occurs, the larger size shall be provided.

#### EXHIBIT "A" - PIPING MATERIALS (HVAC)

<u>SERVICE</u>	<u>PIPE MATERIALS</u>	<u>FITTINGS</u>	<u>CONNECTIONS</u>
Hot water heating	Schedule 40, black steel	Malleable iron and butt weld	Screwed 2 in. and smaller; Welded 2-1/2 in. and larger
Hot water heating (optional)	Type L copper	Wrought copper or cast bronze, solder end	No-lead solder for 2 in. and smaller; 95/5 for 2-1/2 in. and larger

**END OF SECTION**

**SECTION 23 21 10  
WATER SYSTEMS SPECIALTIES**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

**1.2 SUBMITTALS**

- A. Submit product data on water system specialties.

**1.3 GENERAL REQUIREMENTS**

- A. Equipment and accessories shall be rated for a minimum of 125 psi wwp, and 250°F temperatures. Manufacturer's written installation procedures shall become a part of these specifications.

**PART 2 - PRODUCTS**

**2.1 FLOW BALANCERS**

- A. Balancing and flow meter stations suitable for use on heating and cooling systems. Constructed for 125 psi and 250°F.
- B. 6 in. and Smaller: Calibrated balance valve with provisions for connecting a portable differential pressure meter. Flow balancer is to be suitable as a service valve. Meter connections to have built-in check valves. An integral pointer shall register degree of valve openings. Valve shall have internal seals.
1. Balance valve sizes shall be based upon gpm range rather than pipe size.

Balance Valve Size	GPM Range
1/2 in.	Up to 2.5
3/4 in.	2.5 - 4.5
1 in.	4.5 - 10
1-1/4 in.	10 - 15
1-1/2 in.	15 - 30
2 in.	30 - 60

2. Design Equipment: Bell & Gossett "Circuit Setter".
3. Manufacturers: Bell & Gossett, Armstrong, Tour & Anderson.

## 2.2 STRAINERS

- A. Cast semi-steel body or cast iron construction for steel piping and bronze body construction for copper piping; equipped with removable, monel or stainless steel water screen; maximum pressure drop 2 psi with free area at least four times area of pipe. Provided with blow-off outlet.
- B. Sizes 5 in. and Smaller, Y-Pattern Strainer: 125 psig working pressure; flanged ends for NPS 2-1/2 in. and larger, threaded connections for NPS 2 in. and smaller, bolted cover, perforated stainless steel basket and bottom drain connection.
- C. Design Equipment: Mueller.
- D. Manufacturers: Elliott, Keckley, Mueller, Webster, Watts, Spirax-Sarco.

## 2.3 TRIPLE DUTY VALVE

- A. Provide as shown on plans, a straight, angle or straight-angle pattern valve designed to perform the functions of a center guided nonslam check valve, shutoff valve and calibrated balancing valve.
- B. The valve shall be of heavy-duty cast iron (NPT and flanged models only) or ductile iron (grooved models only) construction with connections per ANSI B1.20.1-83 suitable for 175 psi working pressure for operating temperatures up to 250°F. The valve shall be fitted with a bronze seat, replaceable bronze disc with EPDM seat insert or stainless steel stem, and chatter preventing stainless steel spring. The valve design shall permit repacking under full system pressure.
- C. Cv rating shall be provided at every 10% increment opening for the straight and angle valve. Manufacturer shall supply the Cv rating for read-out of flow determination and system pressure drop.
- D. The valve shall be equipped with brass readout valves (with integral check valve) to facilitate taking differential pressure readings across the orifice for accurate system balance. The valve shall be produced at an ISO 9001 approved facility.
- E. Triple duty valve sizes shall be based upon gpm range rather than pipe size. The valve shall be capable of system flow at the lowest open flow pressure drop. Submit performance chart for system balancing for each valve indicating design flow and minimum and maximum turn-down pressure drops.
- F. Design Equipment: Bell & Gossett #3D-B.
- G. Manufacturers: Armstrong Flo-Trex, Bell & Gossett 3D-B, Grundfos, Thrush.

## 2.4 AIR VENTS

- A. Manual air vents shall be a 3/4 in. ball valve with bronze body, nickel plated bronze ball, hose end, cap and chain, Watts B6000CC.



- B. Automatic air vents shall be float type, 35 psig rated, Armstrong No. 502CV OR float type, 150 psig rated, Armstrong No. 75 or Spirotop. Provide unit with an appropriate rating, as necessary for location.
- C. High Capacity Automatic Air Vent:
  1. Cast iron body. 150 psig rated. Stainless steel float.

### **PART 3 - EXECUTION**

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#### **3.1 GENERAL REQUIREMENTS**

- A. Obtain detailed instructions from each manufacturer for proper method of installation.

#### **3.2 SYSTEM FILLING**

- A. After cleaning, fill each system from low point.
- B. With pumps off, vent mains, risers, run-outs, and units, working consecutively from low to high point of building. Obtain approximately 2 psi at highest point. Obtain proper air cushion in compression/expansion tanks.

#### **3.3 AIR VENTING**

- A. Provide where specifically called for in piping details and at all points in piping systems where air may collect due to changes in piping elevation.
  1. Manual air vent assembly consisting of 1-1/4 in. x 4 in. air collection chamber with 3/4 in. hose end ball valve with cap and chain.
  2. Automatic air vent with a ball valve for the purpose of isolation and service or replacement.
  3. Unless otherwise indicated, automatic air vents shall only be installed in Mechanical Rooms. Pipe high capacity air vent discharge down to floor.
- B. Equipment Vents:
  1. When equipment is above mains: Connect run-outs or risers to upper quadrant or top of mains. Install vent assembly concealed within enclosure, consisting of 1 in. diameter by 4 in. to 6 in. long air collection chamber with 1/4 in. soft copper tube to manual valve. Mount securely near bottom of enclosure, but not fastened to enclosure. For individual units, radiators, fan convectors and units with return grilled: Provide screwdriver operated manual valve, operated from discharge grille or access door. Drill enclosure and position valve for operating without removing enclosure.
  2. When equipment is below mains: Connect piping run-outs or risers to bottom or lower quadrant of mains. Vent assembly not required in unit. Provide means of purging and draining each unit if required. Use tees instead of ells at low point of run-outs.

### 3.4 STRAINERS

- A. Install strainers on supply side of each control valve, pressure reducing valve, solenoid valve, in-line pump and elsewhere as indicated. Install NPS 3/4 in. nipple and ball valve in blowdown connection of strainers NPS 2 in. and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2 in.

### 3.5 FLOW BALANCERS

- A. Where flow balancers are smaller than pipe line size, provide reducers directly adjacent to flow balancers.
- B. Provide on zone or riser returns, on each hydronic unit and where called for. Meter connection points shall not point downward.
- C. On terminal heating and cooling unit details where a shut-off valve is shown in conjunction with the flow balancer (3 in. and smaller), if the Armstrong "CBV" or Tour & Anderson "ST" is used, the shut-off valve may be deleted. **This does not apply to AHU coils, pumps, heat exchangers, boilers or chillers.**

### 3.6 TRIPLE DUTY VALVES

- A. Provide an increaser on discharge side of triple duty valve to match full flow pipe size, if triple duty valve is smaller than line size.

**END OF SECTION**

**SECTION 23 31 00**  
**SHEET METAL AND DUCTWORK ACCESSORIES CONSTRUCTION**

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**PART 1 - GENERAL**

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**1.1 WORK INCLUDED**

- A. Provide labor, materials, equipment and services required for the complete installation designed in Contract Documents.

**1.2 QUALITY ASSURANCE**

- A. Ductwork shall be fabricated and installed in compliance with latest edition of the following standards.
1. SMACNA Duct Construction Standards - Metal and Flexible Ductwork.
  2. SMACNA Duct Liner Application Standard.
  3. SMACNA HVAC Air Duct Leakage Test Manual.
  4. NFPA Standards, Bulletin 90A, 96, 101.
  5. Plans and Specifications which exceed the requirements in any of the referenced standards.
  6. Mechanical Code of New York State, Chapter 6.
- B. All sheet metal shall be fabricated and installed by an experienced Contractor specializing in this type of work.
- C. All ductwork and fittings shall have a computer generated label affixed to the exterior surface of each section, detailing all applicable information including the duct dimensions, gauge, reinforcement type/class and connection type by systems manufacturer. Galvanizing thickness shall be clearly stenciled on each duct section.
- D. All ductwork on the project shall meet the SMACNA Duct Cleanliness For New Construction Guidelines, "Advanced Level" of duct cleanliness for production, delivery, storage and installation of ductwork.

**1.3 SUBMITTALS**

- A. Duct Access Doors.
- B. Submit a complete shop standard manual including miscellaneous materials, and construction details for all shop fabricated materials including, but not limited to, volume dampers, turning vanes, duct sealant, equipment flexible connections, access doors, flexible duct, acoustical duct lining, etc.

**1.4 GENERAL**

- A. All adhesives, sealants, primers and paint used for ductwork in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.

**1.5 DUCTWORK CLASSIFICATION**

- A. Duct systems are to be classified and constructed per the SMACNA Velocity-Pressure classification system as follows:
  - 1. All ductwork shall be constructed for a minimum pressure class of 2 in. w.g. (unless stated otherwise) for the following systems, as applicable:
    - a. Typical low pressure supply ductwork.
    - b. Typical low pressure exhaust ductwork.

**PART 2 - PRODUCTS**

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**2.1 DUCTWORK MATERIALS**

- A. Unless otherwise called for, provide materials in accordance with Exhibit I at the end of this section.

**2.2 SQUARE AND RECTANGULAR DUCTWORK**

- A. Manufactured of hot dip galvanized steel, conforming to ASTM A653 and A924, with G90/Z275 coating or aluminum conforming to ASTM B209 as noted. Gauges per SMACNA HVAC Duct Construction Standards, Metal and Flexible.
- B. Transverse and longitudinal duct seams reinforcement shall conform to appropriate tables and figures per SMACNA Velocity-Pressure Classification for duct construction.
  - 1. Transverse joints shall be sealed with duct joint sealant. "Ductmate" or "Nexus" 4-bolt connection systems may be used in lieu of standard construction.
  - 2. Field assembled longitudinal seams shall be sealed with duct sealant. Factory or shop fabricated rolled or machine pressed longitudinal seams does not require sealant.
- C. Corner closures shall be required as described and illustrated by SMACNA Duct Construction Standards.
- D. Throat radius on all elbows shall not be less than the dimension of the duct plane of radius. Where this cannot be maintained, use shorter radius with internal guide vanes, or square elbow with turning vanes.
- E. Bracing and hanging of ductwork shall be per SMACNA Standards for size and system class of ductwork being used.
- F. Any transformations shall not reduce the ductwork cross-sectional area. Maximum angle in straight duct, 20° for diverging flow and 30° for contraction flow. Transformation from square to round or flat to oval seams welded or brazed.

### 2.3 DUCTWORK SEALING

- A. SMACNA Duct Sealing Classification shall be used for duct systems using the following criteria:
1. Ductwork and all plenums with pressure class ratings shall be constructed to seal Class A, as required to meet the requirements of SMACNA Duct Construction Standards and with standard industry practice.
  2. Openings for rotating shafts shall be sealed with bushings or other devices that seal off air leakage. Pressure sensitive tape shall not be used.
  3. All connections shall be sealed, including but not limited to spin-ins, taps, other branch connections, access doors, access panels and duct connections to equipment.
  4. Sealing that would void product listings is not required.
  5. Spiral lock seams need not be sealed.
- B. Duct sealant for indoor applications shall be non-fibrated, water based, Hardcast Iron-Grip IG-601, Ductmate PRO Seal, Foster 32-17 or Childers CP146.
- C. Duct sealant for outdoor applications shall be fibrated, water based, Hardcast Versa-Grip VG-102, Ductmate Fiberseal, Foster 32-17 or Childers CP148.
- D. Sealants and tapes shall be listed and labeled in accordance with UL 181A or UL181B and marked according to type.

### 2.4 ACCESS DOORS

- A. General:
1. Provide access doors of adequate size to allow easy access to the equipment that will require maintenance. Provide insulated or acoustically lined doors to prevent condensation where applicable.
  2. Manufacturer to provide an installed neoprene gasket around perimeter of access door for airtight seal.
  3. Systems 3 in. w.g. or less shall utilize a hinged, cam, or hinged and cam square framed access door.
  4. Approved Manufacturer: Ductmate Industries "Sandwich" style door or approved equal.
  5. All access doors shall be continuous piano hinged type, unless noted otherwise.
  6. Non-hinged only allowed where clearance to ceiling does not allow a full 90° swing.
  7. Single panel uninsulated type allowed in un-insulated duct.
  8. Pressure rated according to system in which being installed. Door-to-frame and frame-to-duct gasketing.
  9. Provide specified Seal Class A or B ductwork sealing around frame, and hand adjust the latch tension for proper seal, on all access doors other than sandwich panel (Ductmate) style.
  10. MINIMUM access door size for ducts 12 in. or less in depth is 12 in. x 8 in.
  11. MINIMUM access door size for ducts 12 in. to 18 in. in depth is 18 in. x 14 in.

12. MINIMUM access door size for ducts more than 18 in. in depth is 24 in. x 18 in.
  13. In ducts which require multiple section fire dampers due to duct size, provide one access door for each fire damper section.
- B. Door Types:
1. Low Pressure Systems (2 in. w.g. pressure class): National Controlled Air ADH-1, Ruskin ADH22, Vent Products 9701, Air Balance FSA-100, Safe Air SAH, Nailor.

## 2.5 CABLE SUSPENSION SYSTEM

- A. Ductwork not required to be exterior insulated in exposed installations may be installed using Gripple Inc. Ductwork shall be installed using load rated, stainless steel cable suspension systems. Cables shall be pre-cut lengths, type 316 stainless steel with fused ends, and pre-made end attachments.
- B. Cable grips shall be of 316 stainless steel and have an internal tamperproof cable release mechanism.
- C. Stress distribution saddles shall be prescribed in addition for the support of rectangular duct on corners as necessary.
- D. Hangers shall have a manufacturer's published safe working load and have a 5 to 1 safety factor.
- E. Hanger assemblies shall be tested and verified by SMACNA and be installed in accordance with SMACNA Standards.

## 2.6 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Ventlock 699 or 699-2 based upon insulation thickness.
- C. Install duct test holes where required for duct traverse testing and balancing purposes.

## PART 3 - EXECUTION

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### 3.1 REQUIREMENTS

- A. Equipment and systems shall be installed in accordance with local and state codes and regulations having jurisdiction. Bracing and hanging of ductwork shall be per SMACNA - HVAC Duct Construction Standard.

- B. Install all ductwork concealed and tight to the structure above unless noted otherwise on shop drawings. Fabricate only after the approval of shop drawings, and in locations to avoid interferences. Ductwork installed without approved shop drawings, which requires removal/modification and/or reinstallation due to conflicts or improper installation shall be repaired at no cost to the Owner.
- C. Sizes given on contract drawings are inside dimensions.
- D. Keep openings continuously closed and sealed with protective plastic wrapping during construction to prevent entrance of dirt and debris.
- E. Extend access openings, damper rods and levers, to outside of external insulation make systems airtight.
- F. No piping, conduit or other obstruction to airflow is permitted in ductwork.
- G. Provide necessary openings, hanger inserts, framing, chases, and recesses, not provided by other trades.
- H. Exposed exhaust or return registers and grilles shall be flush with face of duct; exposed supply registers and grilles shall be mounted outside airstream with 45° shoe-tap extension collars.
- I. Where a return or exhaust duct is shown to be left open ended, provide hardware mesh screen at opening.
- J. For duct penetrations of non-rated walls, provide sheet metal angle framing or sheet metal closure panels around the entire perimeter of each duct wall penetration on both sides of the wall, where the gap exceeds 1/4 inch. Where the gap is less than 1/4 inch, the gap may be caulked on both sides of the wall. Non-rated wall penetrations SHALL NOT be fire caulked under any circumstances.

### 3.2 DUCT CLEANLINESS AND CLEANING AFTER INSTALLATION

- A. Duct Cleanliness:
  1. All ductwork on the project shall meet the SMACNA Duct Cleanliness For New Construction Guidelines, "Advanced Level" of duct cleanliness for production, delivery, storage and installation of ductwork.
  2. Prior to shipment to the jobsite, all duct ends and openings must be covered with a heavy duty, dual-ply, clear polyethylene protective film. Open ends are to be kept covered during transport, storage, and installation. As ductwork is installed at the job site, open ends are to be covered to maintain cleanliness.
  3. The film must be securely affixed to protect against dirt and debris, and must be translucent to facilitate inspection of interior surfaces without removing the film. The film is have a elongation rating of 600% and a break strength of 13.1 lbs./in. The film shall contain no VOC's, and shall leave no residue on duct after removal.
  4. Manufacturer: Ductmate Industries ProGuard (heavy duty grade clear).

**B. Cleaning After Installation:**

1. Interior surfaces shall be free of dust and debris prior to initial start up. Protect equipment which may be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes. Any cleaning of duct systems shall comply with recommendations of NAIMA and NADCA.
2. Clean external surfaces of foreign substances that might cause corrosion, deterioration of the metal, or where ductwork is to be painted.
3. Clean debris from system before fans are turned on.
4. Keep openings continuously closed during the construction period.
5. Pay damages resulting from dirt blown on painted or other finished surfaces.
6. Repair or replace damaged fan wheels, dampers, or other system parts damaged as a result of debris.
7. Clean system as many times as required until the entire system is dirt free.

**3.3 TEST OF DUCTWORK**

- A. Ductwork is not required to be tested for leakage, however, it shall be checked and guaranteed to meet the standards of the specified SMACNA Duct Sealing Classifications. Air balancing and testing shall be used to determine satisfactory operation of duct systems. Balancing reports indicating excessive leakage amounts shall be required to rebuild, repair or seal ductwork having excessive leakage.

**3.4 ACCESS DOORS**

- A. Provide for access to upstream side of dampers, damper motors, control devices, and equipment requiring periodic inspection or service.
- B. For ducts that are too small to install an access door of the minimum specified size, provide a 12" long section of removable ductwork for maintenance and inspection access. Removable ductwork shall be fastened between device requiring access and next duct section with duct flanges or Donaldson Torit clamp with PVC foam seal. For ducts that are required to be insulated, provisions shall be made to allow insulation to be easily removed and re-installed.

**3.5 DUCT SUPPORTS**

- A. Provide per SMACNA, same material as duct. Hanger bands to extend down sides and turn under bottom 2 in. Minimum two metal screws per hanger. Angle iron on larger duct spaced per building structural system but not greater than 8 ft. Provide extra support angles as required.

**3.6 SMOKE DETECTION**

- A. Smoke detectors shall be furnished by Division 26 "Electrical". This Contractor shall install detectors located in ductwork. Clearly indicate locations of smoke detectors on the sheet metal shop drawings.



- B. Increase duct size at smoke detectors, where required for proper installation, per smoke detector manufacturer's recommendations. Coordinate minimum duct size required with Division 26 "Electrical".

**3.7 DUCT SEALING**

A. Preparation:

- 1. Clean surfaces of dirt, oil, grease and loose of foreign matter that could impair adhesion, using soap and water or solvent.
- 2. Allow surfaces to dry completely before proceeding.

B. Installation of Sealant System:

- 1. Apply sealant system to duct joints, fasteners, and seams in accordance with manufacturer's instructions.
- 2. Apply sealant by brush, putty knife or caulk gun, to full coverage. Remove excess adhesive immediately.
- 3. Completely seal duct joint, fasteners and seams without voids, to a minimum 20 mil thick wet film.
- 4. Apply and store at ambient temperature of 40°F to 100°F; and protect from freezing until dry.

C. Field Quality Control:

- 1. Allow duct sealant system to cure a minimum of 72 hours before operating the system.
- 2. Do not apply external duct insulation or coatings until the joints have been inspected by the Owner's Representative.

**EXHIBIT I - DUCTWORK MATERIALS**

<b><u>SERVICE</u></b>	<b><u>MATERIAL</u></b>	<b><u>SPECIAL REQUIREMENTS</u></b>
Supply, return, vent, relief, outside and exhaust	Lock forming quality, galvanized steel ASTM A653 and A924, galvaneal/paint grip if not insulated and exposed	Joints and features as called for

**END OF SECTION**



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**SECTION 23 34 00  
FANS**

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**PART 1 - GENERAL**

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**1.1 DESCRIPTION**

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Drawings.

**1.2 SUBMITTALS**

- A. Submit product data for all fans, motors, drives, and accessories. Include all fan curves fan operating point, and sound data.

**1.3 QUALITY ASSURANCE**

- A. Capacity, size and arrangement, static pressure, brake horsepower, component parts and accessories shall be provided as called for or scheduled. Guaranteed full capacity delivery through duct systems finally installed and under conditions listed. The manufacturer shall guarantee sound-power level ratings not exceeding those of the design equipment. All equipment shall be statically and dynamically balanced to acceptable tolerances with weights permanently fastened. Fan wheels shall be rebalanced in the field, if necessary.

- B. Pressure Classification:

<u>Maximum Total Sp</u>	<u>Class</u>
Up to 3-3/4 in. WG-STD	I

- C. Conventional Motors:

1. Motor sizes shall be as scheduled. Refer to Specification Section 230513 for motor types, efficiency requirements, and acceptable motor manufacturers. All belt-driven fan motors shall be mounted on either an adjustable slide base or a pivoting base.

- D. EC Motors:

1. Motors shall be Electronically Commutated Type (EC), variable speed, DC, brushless motors specifically designed for use with single phase, 277 volt (or 120 volt), 60 hertz electrical input.
2. Motor shall be complete with and operated by a single-phase integrated controller/inverter that operates the wound stator and senses rotor position to electronically commutate the stator.
3. Motors shall be designed for synchronous rotation. Motor rotor shall be permanent magnet type with near zero rotor losses. Motor shall have built-in-soft start and soft speed change ramps.

4. Motor shall be able to be mounted with shaft in horizontal or vertical orientation. Motor shall be permanently lubricated with ball bearings. Motors shall be direct coupled to the blower.
5. Motor shall maintain a minimum of 85% efficiency over its entire operating range and have a turndown to 20% of full speed, (80% turndown).
6. Provide manual fan speed output control for field adjustment of the fan airflow setpoint.
7. Inductors shall be provided to minimize harmonic distortion and line noise.
8. Provide isolation between fan motor assembly and unit casing to eliminate any vibration from the fan to the terminal unit casing.
9. Provide a motor that is designed to overcome reverse rotation and not affect life expectancy.
10. The fan manufacturer shall provide a factory installed PWM controller for either manual or DDC controlled fan CFM adjustment. The manual PWM controller shall be field adjustable with a standard screwdriver. The remote PWM controller shall be capable of receiving a 0-10 VDC signal from the DDC controller (provided by the controls contractor) to control the fan CFM. When the manual PWM controller is used, the factory shall present the fan CFMs as shown on the schedule.
11. Acceptable Manufacturers: Emerson Ultratech, U.S. Motors-Nidec, GE-ECM, A.O. Smith or equivalent.

E. Drive Systems:

1. Provide fans with direct drive systems as scheduled.
  - a. Size for 150% of motor rating when motor is less than 10 HP.
  - b. Provide shaft guards for each driven device. Provide openings in both the motor and fan sections of the guard so that the motor and fan speeds can be checked without removing the guard.
  - c. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts.

F. Bearings:

1. Bearings shall be designed and individually tested specifically for use in air handling applications. Construction shall be heavy-duty regreasable ball type in a pillow block cast iron housing selected for a minimum L50 life in excess of 200,000 hours as maximum cataloged operating speed.

G. Wheels and Propellers:

1. All wheels and propellers shall be balanced in accordance with AMCA Standard 204-96, balance quality and vibration levels for fans. Wheel shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency.
2. Blades on all sizes shall be continuously welded to the backplate and deep spun inlet shroud.
3. All hubs shall be keyed and securely attached to the fan shaft.

- H. Blower Shafts:
  - 1. All blower shafts shall be AISI-C-1045 hot rolled and accurately turned, ground and polished. Shafting shall be sized for a critical speed of at least 125% of maximum cataloged operating speed.
- I. Coating:
  - 1. All steel fan components shall contain an electrostatically applied, baked polyester powder coating. Paint must exceed 1,000 hour salt spray under ASTM B117 test method.
- J. Vibration isolation for units shall be furnished by the fan manufacturer unless otherwise noted.
- K. Certifications:
  - 1. Fan shall be listed by Underwriters Laboratories (UL 705) and UL listed for Canada (CUL 705). Fan shall bear the AMCA certified ratings seal for sound and air performance.
  - 2. All units shall bear an engraved aluminum nameplate and shall be shipped in ISTA certified transit-tested packaging.

## **PART 2 - PRODUCTS**

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### **2.1 ROOF FANS**

- A. Manufacturers: Subject to compliance with requirements of this section, provide products by one of the following:
  - 1. Cook, Greenheck, Twin City.
- B. Spun Aluminum Upblast Centrifugal Exhaust Ventilator:
  - 1. Construction:
    - a. The fan shall be bolted and welded construction utilizing corrosion resistant fasteners. The spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure.
    - b. The aluminum base shall have continuously welded curb cap corners for maximum leak protection.
    - c. The windband shall have a rolled bead for added strength.
    - d. A top cap shall have quick release latches to provide access into the motor compartment.
    - e. An integral conduit chase shall be provided through the curb cap and into the motor compartment to facilitate wiring connections.
    - f. Bearings and drives shall be mounted on a minimum 14 gauge steel power assembly, isolated from the unit structure with rubber vibration isolators. These components shall be enclosed in a weather-tight compartment, separated from the exhaust airstream.

- g. Hinged at curb so that entire fan can be tilted upward for maintenance, access to dampers, and access to damper motor.
  - h. 1/2 in. x 1/2 in. aluminum wire mesh bird screen.
2. Wheel:
- a. Wheel shall be centrifugal backward inclined, constructed of 100% aluminum, including a precision machined cast aluminum hub.
3. Accessories:
- a. Backdraft Damper - Motorized.
  - b. Roof Curb in accordance with Section 230530.
  - c. Disconnect Switch - Factory wired and mounted.
4. Basis-of-Design: Greenheck CUBE.

## 2.2 CONTROL (MOTORIZED) DAMPERS

- A. Manufacturers: Subject to compliance with requirements of this section, provide products by one of the following:
- 1. Ruskin, Tamco, Greenheck.
- B. Provide control dampers as shown on the drawings and diagrams, to meet the following minimum construction standards:
- 1. Leakage: Class 1, 4 CFM/sq. ft. at 1 in. w.c., tested per AMCA Standard 500-D-98, and AMCA Standard 500-D-98, and AMCA Standard 511 and bearing AMCA's Certified Ratings for both air performance and air leakage.
  - 2. Frame: 16 gauge galvanized steel structural hat channel with tabbed corners for reinforcement to meet 13 gauge criteria.
  - 3. Blades: 14 gauge (equivalent thickness galvanized steel) roll forward air foil type for low pressure drop and low noise generation. Blades shall be parallel for two-position dampers and opposed, for modulating dampers.
  - 4. Blade Seals: Ruskiprene, suitable for -72°F to 275°F mechanically locked into the blade edge.
  - 5. Jamb Seals: Flexible metal compression type.
  - 6. Blade Axles: 1/2 in. plated steel hexagonal positively locked into the damper blade. Linkage concealed out of the airstream.
  - 7. Bearings: Corrosion resistant, permanently lubricated stainless steel sleeve.
  - 8. Dampers subject to corrosive fumes or humidity shall be constructed of stainless steel.
  - 9. Dampers over 48 in. in length and height shall be made in multiple sections.
  - 10. Where damper sizes are not specifically indicated, they shall be sized by the Contractor. Maximum velocity shall be 1500 FPM and maximum pressure drop 0.1 in. w.g.
  - 11. Where shown or required for proof of closure or open position, provide factory installed damper positioning switch package Ruskin Model SP-100.

- 12. Dampers shall be as manufactured by Ruskin CD 60 control damper, or equivalent Tamco, Greenheck or Nailor.
- 13. Basis of Design: Ruskin CD60.

**PART 3 - EXECUTION**

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**3.1 INSTALLATION OF EQUIPMENT**

- A. Provide equipment in accordance with manufacturer's instructions. All fans shall meet the intent of the system performance requirements. Provide necessary support steel for equipment. Provide guards for all exposed belts, shafts, and fan wheels. Change pulley sizes or adjust sheaves as required to make systems deliver specified quantities of air as listed on the Contract Drawings.

**END OF SECTION**

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**SECTION 23 73 13**  
**AIR HANDLING UNITS - PENTHOUSE**

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**PART 1 - GENERAL**

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**1.1 DESCRIPTION**

- A. Provide labor, materials, equipment and services as required for the complete installation as shown on the Contract Documents.

**1.2 RELATED SECTIONS**

- A. See Specification Section 230550 - "Wind Restraint for HVAC Systems".

**1.3 SUBMITTALS**

- A. Submit unit performance including capacity, nominal and operating performance.
- B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.
- C. Submit shop drawings indicating overall dimensions as well as installation, operation and service clearances. Indicate lift points and recommendations. Indicate unit shipping split locations and split dimensions, installation and operating weights including dimensions.
- D. Provide fan curves with specified operating point clearly plotted.
- E. Submit data on electrical requirements. Include safety and startup instructions.
- F. Submit sound data derived from testing performed in accordance with AMCA standard 300.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. Units may be shipped fully assembled or disassembled to the minimum module size in accordance with shipping or jobsite requirements.
- B. The units must be rigged and lifted in strict accordance with the manufacturer's recommendations.
- C. All unit openings must be sealed to prevent the entrance of construction dust.
- D. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters in place, bearings lubricated (if applicable), condensate properly trapped, piping connections verified and leak tested, belts aligned and tensioned, all shipping braces removed, bearing setscrews torqued, and fan has been test run under observation.

## PART 2 - PRODUCTS

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### 2.1 GENERAL REQUIREMENTS

- A. The units shall consist of the AHU modules as shown on the plans.
- B. Air-handling units to fit intended use and location as called for. Capacity, size and arrangement, static pressure, brake horsepower, component parts and accessories as called for and as necessary to obtain required results and allow for proper maintenance. Ratings based on standard Test Code for Centrifugal Fans adopted jointly by AMCA and ASHRAE. Each size fan to be supplied shall be tested in the manufacturer's laboratory under simulated installation conditions. Ratings based on test, not on interpolated or extrapolated calculation. Guaranteed full capacity delivery through duct systems finally installed and under conditions listed. Guaranteed sound power level ratings not exceeding those of design equipment or as scheduled.
- C. Source Limitations: Obtain modular rooftop air-handling units through one (1) source from a single manufacturer.
- D. ARI Certification: Air-handling units and their components shall be factory tested according to the applicable ARI Standard and shall be listed and labeled by ARI.
- E. If more than one manufacturer is listed as make, Contractor must be certain that equipment submitted fits properly into indicated space conditions, same as design equipment.
- F. Motors shall conform to the requirements of Specification Section 23 05 13 -"Motors and Adjustable Speed Drives".

### 2.2 AIR-HANDLING UNITS

- A. Casing:
  - 1. Fabricate unit casing of nom. 16 gauge channel posts and removable panels assembled with mechanical fasteners and galvanized steel or painted galvanized steel. All panels, access doors, and ship sections shall be sealed with permanently applied bulb-type gasket to prevent thermal bridging from interior to exterior of unit.
    - a. Panels and access doors shall be constructed as a 2-inch nominal thick; thermal broke double wall assembly, injected with foam insulation with an R-value of not less than R-13.
    - b. Exterior surfaces shall be constructed of G60 pre-painted galvanized steel for aesthetics and long term durability. Paint finish includes a base primer with a high quality, polyester resin topcoat of a neutral beige color which meets or exceeds a 750 hour salt spray in accordance with ASTM 117 standard for salt spray resistance (nom. 22 gauge).

- c. Provide cross broke roof cap system to divert water from the top surfaces of the air handler. The rain shed roof cap shall have 2 in. standing seams covered with splice cap channels to seal top and side of seam. Drip shield shall be provided on all four (4) sides of unit to direct water from roof cap away from sides of unit.
- d. Internal lining on all sections shall be constructed of nom. 26 gauge galvanized steel.
- e. Floor plate in all sections shall be constructed of galvanized steel (nom. 26 gauge).
- f. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, maximum 5 inches of positive or 6 inches of negative static pressure. Deflection shall be measured at the panel midpoint.
- g. The casing leakage rate shall not exceed .5 cfm per square foot of cabinet area at 5 inches of positive static pressure or 6 inches of negative static pressure.
- h. Entire unit shall have a standard full perimeter base rail of 6 in. for structural rigidity and condensate trapping. Curb-ready base rail shall have sloped drip pans located under all sections except duct openings and shall be supported by frame members.
- i. Roof curb kit of 24 in. height shall provide support for the air handler on the building roof and provide a weather-protected area for terminating and securing the roof membrane. The roof curb kit shall be manufactured and shipped separately from the air handler.
- j. An insulated, double-walled Coil piping vestibule 18 in. shall be factory installed of standard cabinet construction on the coil connection side of the unit. Roof cap over vestibule should be a continuous single piece covering both the coil section and the vestibule. Roof cap seams between coil section and vestibule are not allowed.

- 2. Module-to-module assembly shall be accomplished with an overlapping, full perimeter internal splice joint that is sealed with bulb-type gasketing on both mating modules to minimize onsite labor along with meeting indoor air quality standards.
- 3. Insulation: 2 in. thick, injected foam insulation with an R-value of not less than R-13.
- 4. Access Doors: Made of galvanized steel, flush mounted to cabinetry with minimum of two (2) 6 in. long stainless steel piano-type hinges, two (2) latches and full size (4.5 in. minimum) handle assembly. Doors shall have double gasketing. Doors that are not full height shall have top gutter channel for diverting water runoff away. Doors shall swing outward. Positive pressure sections shall have a secondary latch to relieve pressure and prevent injury upon access.

B. Supply Fans:

- 1. Provide a single width, single inlet, class II, direct-drive airfoil plenum supply fan. Fan assemblies including fan, motor and sheaves shall be dynamically balanced by the manufacturer on all three (3) planes and at all bearing supports. Manufacturer must ensure maximum fan rpm is below the first critical speed.

2. Fan and motor shall be mounted internally on a steel base. Factory-mount motor on slide base that can be slid out the side of the unit if removal is required. Provide access to motor, drive, and bearings through hinged access door. Fan and motor assembly shall be mounted on 2 in. deflection spring vibration-type isolators inside the cabinetry.
- C. Bearings and Drives:
1. Bearings: Basic load rating computed in accordance with AFBMA - ANSI Standards. The bearings shall be provided on the motor with the fan wheel mounted directly on the motor shaft, AMCA arrangement 4.
  2. Shafts shall be solid, hot-rolled steel, ground and polished, keyed to shaft and protectively coated with lubricating oil. Hollow shafts are not acceptable.
- D. Electrical:
1. The air handler shall be ETL listed by Intertek Testing Services, Inc. Units shall conform to bi-national standard ANSI/UL Standard 1995/CSA Standard C22.2 No. 236.
  2. Wiring Termination: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclosed terminal lugs in terminal box sized to NFPA 70.
  3. Provide marine light and GFI receptacle in fan with removable panel or door, access section mounted and wired to a junction box and on-off switch mounted on the outside of the cabinet.
  4. A factory installed ABB variable frequency drive shall be provided with a disconnecting circuit breaker and input line reactor. The drive will be located inside the conditioned air stream with the keypad mounted outside the cabinet in a NEMA 3R enclosure.
- E. Heating Coil Sections:
1. Provide access to coils for service and cleaning. Enclose coil headers and return bends fully within unit casing. Unit shall be provided with coil connections that extend a minimum of 5 in. beyond unit casing for ease of installation. Drain and vent connections shall be provided exterior to the unit casing. Coil connections on curb-ready base units must be factory sealed with grommets on interior and exterior and gasket sleeve between outer wall and liner where each pipe extends through the unit casing to minimize air leakage and condensation inside the panel assembly. If not factory packaged, Contractor must supply all coil connection grommets and sleeves. Coils shall be removable through side of unit.
  2. Certify air coil capacities, pressure drops and selection procedures in accordance with ARI 410.
  3. Water Coils:
    - a. Fins shall have a minimum thickness of 0.0075 in. of aluminum plate construction. Fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat

transfer. Tubes shall be mechanically expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates. Bare copper tubes shall not be visible between fins.

- b. Coil tubes shall be 5/8 in. OD seamless copper, 0.035 in. nominal tube wall thickness expanded into fins, brazed at joints. Soldered U-bends shall be provided to minimize the effects of erosion and premature failure having a minimum tube wall thickness of .025 in. One-half in. tubes and hairpin construction are not acceptable.
- c. Water coils shall be provided with headers of seamless copper tubing with intruded tube holes to permit expansion and contraction without creating undue stress or strain. Coil connections shall be copper with connection size to be determined by manufacturer based upon the most efficient coil circuiting. Vent connections provided at the highest point to assure proper venting. Drain connections shall be provided at the lowest point.
- d. Coil casings shall be a formed channel frame of galvanized steel.
- e. Coil piping vestibule 18 in. shall be provided.

F. Filters:

- 1. Filter section with filter racks and guides with hinged and latching access doors on either sides for side loading and removal of filters.
- 2. Filter media shall be UL 900 listed, Class I or Class II.
- 3. Flat arrangement with 2 in. deep pleated MERV 8 panel filters.

G. Additional Sections:

- 1. Access section shall provide access between the coil and fan section and shall be a minimum of 16 in. deep. Access doors of galvanized steel for flush mounting with gasket, latch and full size (minimum of 4.5 in.) handle assembly.
- 2. Discharge plenum section shall be provided as the last section in the direction of airflow. The plenum shall provide single bottom openings.

H. Dampers:

- 1. Motorized Outside Air Damper: Dampers shall be hollow core galvanized steel airfoil blades, fully gasketed and have continuous vinyl seals between damper blades in a galvanized steel frame. Dampers shall have stainless steel jamb seals along end of dampers. Damper Leakage: Leakage rate shall be less than two tenths of one percent leakage at 2 inches static pressure differential. Leakage rate tested in accordance with AMCA Standard 500.

I. Design Equipment:

- 1. Penthouse (Rooftop) Units: Daikin Applied Skyline.
- 2. Makes: Daikin Applied Skyline, York by Johnson Controls, Carrier.

## PART 3 - EXECUTION

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### 3.1 INSTALLATION

- A. Provide equipment in accordance with manufacturer's recommendations and compatible with intent of the respective system performance requirements.
- B. Provide vibration isolators in accordance with manufacturer's recommendations and as called for. Provide necessary steel-supporting framework for equipment requiring same. Braced against swaying.
- C. Install piping adjacent to machine to allow service and maintenance. Do not block access doors or coil pull-space with piping.
- D. Start-Test-Check:
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.
  - 2. Engage a factory-authorized service representative to perform startup service.
  - 3. Verify that shipping, blocking, and bracing are removed.
  - 4. Verify that unit is secure on mountings and supporting devices and that connection to piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
  - 5. Leak Test: After installation, fill water coils with water and test coils and connections for leaks. Repair leaks and retest until no leaks exist.
  - 6. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units and retest.
  - 7. Verify that specified filters are installed. Check for leakage around filters.
  - 8. Clean air-handling units internally and on completion of installation according to manufacturer's written instructions. Clean fan interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheels, cabinets, and coils entering air space.
  - 9. After completing system installation and testing, adjusting, and balancing modular indoor air-handling and air-distribution systems, clean filter housings and install new filters.

**END OF SECTION**

**SECTION 23 82 39  
UNIT HEATERS (HYDRONIC)**

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**PART 1 - GENERAL**

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**1.1 DESCRIPTION**

- A. Provide labor, materials, equipment and services as required for the complete installation and related work as shown on the Contract Documents.

**1.2 SUBMITTALS**

- A. Submit product data for unit heaters and cabinet unit heaters.

**PART 2 - PRODUCTS**

---

**2.1 GENERAL REQUIREMENTS**

- A. Free from expansion and contraction noises and strains. Fan speed shown on Schedule shall not be exceeded. Each piece of equipment shall be factory-boxed and tagged by room number. Cabinet unit heaters and unit heaters shall have baked enamel finish with color selected by the Architect from manufacturer's standard colors. Rating in accordance with standard test codes adopted jointly by IUGA and ASHRAE.

**2.2 UNIT HEATERS**

- A. General:
1. Wall hung or ceiling suspended.
  2. Access for servicing the heating element, motors, and controls.
  3. Horizontal discharge units with adjustable horizontal and/or vertical outlet vanes.
  4. Vertical units with adjustable outlet louvers or diffusers.
- B. Fan and Motor:
1. Statically and dynamically balanced.
  2. Motor shall be totally enclosed and designed for continuous operation. Lubrication shall be sealed-in, permanent type.
  3. Wall mounted line voltage thermostat.
- C. Heating Element (Hydronic):
1. Serpentine coil, copper tube, aluminum fins, back or side connections to fit headroom requirements.
  2. Aquastat on return side to prevent fan operation when heat is not available.

- D. Hydronic:
1. Design Equipment: Sterling.
  2. Acceptable Makes: Daikin Applied, Airtherm, Dunham-Bush, McQuay, Sterling, Trane, Vulcan.

### **PART 3 - EXECUTION**

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#### **3.1 INSTALLATION - GENERAL**

- A. Provide equipment in accordance with manufacturer's printed instructions. Report untrue walls before installation. Report cases where clearance below suspended heaters is less than 7-1/2 ft. Provide clearance for piping and conduit. Support units independent of piping. Support units from building structure, with screws or bolts, no nailing allowed. Be responsible for proper location and size of recesses. Coordinate installation of recessed or semi-recessed equipment in recesses. Provide framing in recess and shims. Use sponge rubber gasket air-seal between front enclosure and wall.

#### **3.2 INSTALLATION - HYDRONIC**

- A. Provide valves and accessories and arrange to permit servicing. Coordinate correct end connections and coil arrangements.
- B. Vertical cabinet heaters that are mounted on an existing wall shall be provided with continuous wood blocking that is painted to match the wall to infill any gaps created by the baseboard.

**END OF SECTION**



**SECTION 26 05 00****BASIC ELECTRICAL REQUIREMENTS**

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**PART 1 - GENERAL**

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**1.1 WORK INCLUDED**

- A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these contract documents. All materials and equipment shall be installed in accordance with the manufacturer's recommendations.

**1.2 LICENSING**

- A. The Contractor shall hold a license to perform the work as issued by the authority having jurisdiction.
- B. Plumbing contract work shall be performed by, or under, the direct supervision of a licensed master plumber.
- C. Electrical contract work shall be performed by, or under, the direct supervision of a licensed electrician.

**1.3 PERMITS**

- A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges. Provide certificate of approval from the Authority having jurisdiction prior to request for final payment.
- B. Provide electrical inspection certificate of approval from Middle Department Inspection Agency, Commonwealth Inspection Agency, or an Engineer approved Inspection Agency prior to request for final payment.

**1.4 CODE COMPLIANCE**

- A. Provide work in compliance with the following:
  - 1. Building Code of New York State.
  - 2. Mechanical Code of New York State.
  - 3. Plumbing Code of New York State.
  - 4. Fire Code of New York State.
  - 5. Energy Conservation Construction Code of New York State.
  - 6. New York State Department of Labor Rules and Regulations.
  - 7. New York State Department of Health.
  - 8. National Electrical Code (NEC).

9. Occupational Safety and Health Administration (OSHA).
10. Local Codes and Ordinances.
11. Life Safety Codes, NFPA 101.
12. Town of Evans Plumbing Department.

## 1.5 GLOSSARY

ACI	American Concrete Institute
AGA	American Gas Association
AGCA	Associated General Contractors of America, Inc.
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AFBMA	Anti-Friction Bearing Manufacturer's Association
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASTM	American Society for Testing Materials
AWSC	American Welding Society Code
AWWA	American Water Works Association
FM	Factory Mutual Insurance Company
IBR	Institute of Boiler & Radiation Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NYS/DEC	New York State Department of Environmental Conservation
SBI	Steel Boiler Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UFPO	Underground Facilities Protective Organization
UL	Underwriter's Laboratories, Inc.

OSHA	Occupational Safety and Health Administration
XL - GAP	XL Global Asset Protection Services

## 1.6 DEFINITIONS

Acceptance	Owner acceptance of the project from Contractor upon certification by Engineer.
As Specified	Materials, equipment including the execution specified/shown in the contract documents.
Basis of Design	Equipment, materials, installation, etc. on which the design is based. (Refer to the article, Equipment Arrangements, and the article, Substitutions.)
Code Requirements	Minimum requirements.
Concealed	Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
Coordination Drawings	Show the relationship and integration of different construction elements and trades that require careful coordination during fabrication or installation, to fit in the space provided or to function as intended.
Delegated-Design Services	(Performance and Design criteria for Contractor provided professional services). Where professional design services or certifications by a design professional are specifically required of a Contractor, by the Contract Documents. Provide products and systems with the specific design criteria indicated.  If criteria indicated is insufficient to perform services or certification required, submit a written request for additional information to the Engineer.  Submit wet signed and sealed certification by the responsible design professional for each product and system specifically assigned to the Contractor to be designed or certified by a design professional.  Examples: structural maintenance ladders, stairs and platforms, pipe anchors, seismic compliant system, wind, structural supports for material equipment, sprinkler hydraulic calculations.
Equal, Equivalent, Equal To, Equivalent To, As Directed and As Required	Shall all be interpreted and should be taken to mean "to the satisfaction of the Engineer".
Exposed	Work not identified as concealed.
Extract	Carefully dismantle and store where directed by Engineer and/or reinstall as indicated on drawings or as described in specifications.
Furnish	Purchase and deliver to job site, location as directed by the Engineer.
Inspection	Visual observations by Engineer.

Install	Store at job site if required, proper placement within building construction including miscellaneous items needed to affect placement as required and protect during construction. Take responsibility to mount, connect, start-up and make fully functional.
Labeled	Refers to classification by a standards agency.
Manufacturers	Refer to the article, Equipment Arrangements, and the article, Substitutions.
Prime Professional	Engineer having a contract directly with the Owner for professional services.
Product Data	Illustrations, standard schedules, performance charts, instructions, brochures, wiring diagrams, finishes, or other information furnished by the Contractor to illustrate materials or equipment for some portion of the work.
Provide (Furnish and Install)	Contractor shall furnish all labor, materials, equipment and supplies necessary to install and place in operating condition, unless otherwise specifically stated.
Relocate	Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.
Remove	Dismantle and take away from premises without added cost to Owner, and dispose of in a legal manner.
Review and Reviewed	Should be taken to mean to be followed by "for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents".
Roughing	Pipe, duct, conduit, equipment layout and installation.
Samples	Physical full scale examples which illustrate materials, finishes, coatings, equipment or workmanship, and establishes standards by which work will be judged.
Satisfactory	As specified in contract documents.
Shop Drawings	Fabrication drawings, diagrams, schedules and other instruments, specifically prepared for the work by the Contractor or a Sub-contractor, manufacturer, supplier or distributor to illustrate some portion of the work.
Site Representative	Engineer at the work site.
Submittals Defined (Technical)	Any item required to be delivered to the Engineer for review as requirement of the Contract Documents.  The purpose of technical submittals is to demonstrate for those portions of the work for which a submittal is required, the manner in which the Contractor proposes to conform to the information given and design concepts expressed and required by the Contract Documents.

**1.7 SHOP DRAWINGS/PRODUCT DATA/SAMPLES**

- A. Refer to Section 013300 - Shop Drawing Procedures for requirements.

**1.8 PROTECTION OF PERSONS AND PROPERTY**

- A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

**1.9 EQUIPMENT ARRANGEMENTS**

- A. The contract documents are prepared using one manufacturer as the Basis of Design, even though other manufacturers' names are listed. If Contractor elects to use one of the listed manufacturers other than Basis of Design, submit detailed drawings, indicating proposed installation of equipment. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in the work of other trades, at no cost to the Owner. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace doorframes, access doors, walls, ceilings, or floors required to install other than Basis of Design. If revised arrangement submittal is rejected, revise and resubmit specified Basis of Design item which conforms to Contract Documents.

**1.10 SUBSTITUTIONS**

- A. See Section 012500 - Substitution Procedures for requirements.

**1.11 CONTINUITY OF SERVICES**

- A. The building will be in use during construction operations. Maintain existing systems in operation within all rooms of building at all times. Refer to "General Conditions of the Contract for Construction" for temporary facilities for additional contract requirements. Schedules for various phases of contract work shall be coordinated with all other trades and with Owner's Representative. Provide, as part of contract, temporary mechanical and electrical connections and relocations as required to accomplish the above. Obtain approval in writing as to date, time, and location for shutdown of existing mechanical/electrical facilities or services.
- B. Refer to Section 013113 - Coordination with Owner's Operations for additional requirements.

**1.12 ROUGHING**

- A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.

- B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of the contract to accommodate obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. **DO NOT SCALE** plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Engineer for review. Obtain written approval for all major changes before installing.
- C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.
- D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Engineer exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, and other items.
- E. Before roughing for equipment furnished by Owner or in other contracts, obtain from Owner and other Contractors, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:
  1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.
  2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Engineer.

### 1.13 REMOVAL WORK

- A. Where existing equipment removals are called for, submit complete list to Engineer. All items that Owner wishes to retain that do not contain asbestos or PCB Material shall be delivered to location directed by Owner. Items that Owner does not wish to retain shall be removed from site and legally disposed of. Removal and disposal of material containing asbestos, lead paint, mercury and PCB's shall be in accordance with Federal, State and Local law requirements. Where equipment is called for to be relocated, contractor shall carefully remove, clean and recondition, then reinstall. Remove all abandoned piping, wiring, equipment, lighting, ductwork, tubing, supports, fixtures, etc. Visit each room, crawl spaces, and roofs to determine total Scope of Work. The disturbance or dislocation of asbestos-containing materials causes asbestos fibers to be released into the building's atmosphere, thereby

creating a health hazard to workmen and building occupants. Consistent with Industrial Code Rule 56 and the content of recognized asbestos-control work, the Contractor shall apprise all of his workers, supervisory personnel, subcontractors, Owner and Engineer who will be at the job site of the seriousness of the hazard and of proper safeguards and work procedures which must be followed, as described in New York State Department of Labor Industrial Code Rule 56.

- B. For materials indicated to contain lead, that are being affected by demolition or construction, the contractor shall be in accordance with all Federal, State and Local law requirements regarding worker exposure to lead disturbance and abatement procedures.
- C. Refer to the Owner's Lead Paint Survey. The Survey identifies the surfaces within the buildings that were tested for lead by collecting paint samples and performing laboratory analysis. If any unidentified surfaces are to be impacted the lead content shall be tested by analytical determinations conducted by a qualified laboratory approved by the Owner. The contractor shall review the current owner's lead paint reports on file before starting any work which may disturb existing surfaces.

#### 1.14 REFRIGERANT RECOVERY

- A. Existing equipment to be removed, as shown on the plans may contain refrigerant and refrigerant oils. This refrigerant and refrigerant oil must be handled in accordance with Federal, State and Local law requirements.
- B. Removal and recovery of refrigerant shall be in accordance with the current edition of Section 608 of the Clean Air Act of 1990, including all final regulations.
- C. Refrigerant recovery must be performed by a technician, certified by an EPA-approved certification program, using refrigerant recovery and recycling equipment certified by an EPA-approved testing organization.
- D. Owner "reserves the right of first refusal" on ownership of recovered refrigerant. Should Owner choose to maintain ownership of refrigerant, refrigerant shall be reclaimed, cleaned by this Contractor to ARI 700-1993 Standard of Purity, by an EPA certified refrigerant reclaimer. Refrigerant shall be turned over to the Owner in suitable marked containers to be stored on site, at a place of the Owner's choosing.

#### 1.15 EQUIPMENT AND MATERIAL INSTALLATION

- A. Provide materials that meet the following minimum requirements:
  1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
  2. All equipment and material for which there is a listing service shall bear a UL label.
  3. Potable water systems and equipment shall be built according to AWWA and NSF Standards.
  4. Electrical equipment and systems shall meet UL Standards and requirements of the NEC.

- B. Exterior and wet locations shall utilize materials, equipment supports, mounting, etc. suitable for the intended locations. Metals shall be stainless steel, galvanized or with baked enamel finish as a minimum. Finishes and coatings shall be continuous and any surface damaged or cut ends shall be field corrected in accordance with the manufacturer's recommendations. Hardware (screws, bolts, nuts, washers, supports, fasteners, etc.) shall be:
1. Stainless steel where the associated system or equipment material is stainless steel or aluminum.
  2. Hot dipped galvanized or stainless steel where the associated system or equipment is steel, galvanized steel or other.

### 1.16 CUTTING AND PATCHING

- A. Each trade shall include their required cutting and patching work unless otherwise shown. Refer to General Conditions for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch cut or abandoned holes left by removals of equipment or fixtures. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

### 1.17 PAINTING

- A. Paint all insulated and bare piping, pipe hangers and supports exposed to view in mechanical equipment rooms, penthouse, boiler rooms and similar spaces. Paint all bare piping, ductwork and supports exposed to the out-of-doors. Paint all equipment that is not factory finish painted (i.e. expansion tanks, etc.).
- B. All painting shall be in accordance with Section 099100 - Field Painting. All surfaces must be thoroughly cleaned before painting. Review system color coding prior to painting with the Engineer or Architect.
- C. All items installed after finished painting is completed and any damaged factory finish paint on equipment furnished under this contract must be touched up by the Contractor responsible for same.
- D. Include painting for patchwork with color to match adjacent surfaces. Where color cannot be adequately matched, paint entire surface.
- E. All primers and paint used in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.
- F. Color coding of piping shall comply with the Ten States Standards.



**1.18 EXISTING CEILING REMOVAL AND RE-INSTALLATION**

- A. In a renovation project, any existing ceiling removal and re-installation work required for the completion of a Contractors or Subcontractors work, shall be removed and re-installed by that Contractor or Subcontractor. This applies in any areas not called for to have a new ceiling installed.
- B. The ceiling removal and re-installation shall include lay-in ceiling tile and grid, to the extent necessary to accomplish the work. Removed ceiling tile and grid shall be safely stored during the course of the work, and it shall be re-installed to the original existing condition.
- C. The ceiling removal and re-installation shall include gypsum board or plaster ceilings and the associated suspension systems. Removed ceiling areas shall be patched with materials to match the existing ceiling, and painted to match. If paint cannot be matched exactly, paint the entire ceiling a similar color.

**1.19 CONCEALMENT**

- A. Conceal all contract work above ceilings and in walls, below slabs, and elsewhere in finished areas of the buildings. If concealment is impossible or impractical, notify Engineer before starting that part of the work and install only after his review. In areas with no ceilings, install only after Engineer reviews and comments on arrangement and appearance.

**1.20 CHASES**

- A. In Existing Buildings:
  - 1. Drill holes for floor and/or roof slab openings.
  - 2. Multiple pipes smaller than 1 in. properly spaced and supported may pass through one 6 in. or smaller diameter opening.
  - 3. Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge galvanized sleeves at fire rated assemblies. Extend sleeves 2 in. above floors.
  - 4. In wall openings, drill or cut holes to suit. Provide 18 gauge galvanized sleeves at shafts and fire rated assemblies. Provide fire-stopping seal between sleeves and wall in drywall construction. Provide fire stopping similar to that for floor openings.

**1.21 PENETRATION FIRESTOPPING**

- A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:
  - 1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.

2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.
6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.
7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.

**B. Acceptable Manufacturers:**

1. Dow Corning Fire-Stop System Foams and Sealants.
2. Nelson Electric Fire-Stop System Putty, CLK and WRP.
3. S-100 FS500/600, Thomas & Betts.
4. Carborundum Fyre Putty.
5. 3-M Fire Products.
6. Hilti Corporation.

## 1.22 NON-RATED WALL PENETRATIONS

- A. Each trade shall be responsible for sealing wall penetrations related to their installed work, including but not limited to ductwork, piping, conduits, etc. See individual specification sections for requirements.

## 1.23 SUPPORTS

- A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. For precast panels/planks and metal decks, support mechanical/electrical work as determined by manufacturer and the Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.
- B. Equipment, piping, conduit, raceway, etc. supports shall be installed to minimize the generation and transmission of vibration.
- C. Materials and equipment shall be solely supported by the building structure and connected framing.

**1.24 HVAC EQUIPMENT CONNECTIONS**

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Provide final hot water, drain and vent connections to all equipment as required by the equipment. Provide final connections, including domestic water piping, wiring, controls, and devices from equipment to outlets left by other trades. Provide equipment waste, drip, overflow and drain connections extended to floor drains.
- C. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, insulation, sheet metal work, controls, dampers, as required.
- D. Refer to manufacturer drawings and specifications for requirements of special equipment. Verify connection requirements before bidding.

**1.25 PLUMBING EQUIPMENT CONNECTIONS**

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Provide roughing and final water and indirect waste connections to all equipment. Provide loose key stops, adapters, and all necessary piping and fittings from roughing point to equipment. Provide installation of equipment furnished by others. Provide cold water line with gate valve and backflow prevention device at locations called for. Provide continuation of piping and connection to equipment that is furnished by others. Provide relief valve discharge piping from equipment relief valves.
- C. Provide valved water outlet adjacent to equipment requiring same. Provide equipment type floor drains, or drain hubs, adjacent to equipment.
- D. Install controls and devices furnished by others.
- E. Refer to Contract Documents for roughing schedules, and equipment and lists indicating scope of connections required.
- F. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, pressure reducing valves, gauges, relief valves, vents, drains, as required.
- G. Refer to Manufacturer drawings and specifications for requirements of special equipment. Verify connection requirements before bidding.

**1.26 ELECTRICAL EQUIPMENT CONNECTIONS**

- A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Provide heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.
- B. Provide for Owner furnished and Contractor furnished equipment all power wiring, electric equipment, control wiring, switches, lights, receptacles, and connections as required.
- C. Refer to Manufacturer's drawings/specifications for requirements of special equipment. Verify connection requirements before bidding.

**1.27 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT**

- A. Store Materials on dry base, at least 6 in. aboveground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.
- B. Refer to Section 016600 - Product Storage and Handling Requirements for additional information.
- C. The Contractor shall provide airtight plastic covers over all supply and return air openings prior to the start of construction. The plastic shall be maintained airtight throughout the project construction and removed only with the approval of the Engineer.

**1.28 FREEZING AND WATER DAMAGE**

- A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner.

**1.29 OWNER INSTRUCTIONS**

- A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

**1.30 OPERATION AND MAINTENANCE MANUALS**

- A. Refer to Section 017823 - Operation and Maintenance Data for requirements.

**1.31 RECORD DRAWINGS**

- A. Refer to Section 017840 - Record Documents for requirements.

**1.32 TEMPORARY HEATING AND COOLING**

- A. Systems and equipment installed as part of this project shall not be used for temporary heating or cooling.

**1.33 TEMPORARY FACILITIES**

- A. Refer to the Division 1 Sections, General Conditions and Supplementary Conditions.

**1.34 TEMPORARY LIGHT AND POWER**

- A. Refer to the Division 1 Sections, General Conditions and Supplementary Conditions.

**1.35 CLEANING**

- A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:
  1. Thoroughly clean entire installation, both exposed surfaces and interiors.
  2. Remove all debris caused by work.
  3. Remove tools, surplus, materials, when work is finally accepted.

**1.36 SYSTEM START-UP AND TESTING**

- A. Prior to commencement of work, the Contractor(s) affecting such system shall survey all building electrical systems and components, including fire alarm, intrusion, communications, clock and computer; make written notice to the Owner regarding existing damages, missing items and incomplete systems. Prior to the conclusion of this project, the Contractor shall verify with the Engineer that all building system has been returned to their original conditions.
- B. The Contractor shall be responsible for providing temporary filter media over all supply air registers and diffusers during the HVAC system start-up procedure. The Contractor shall provide airtight plastic covers over all supply and return air openings prior to the start of construction. The plastic shall be maintained airtight throughout the project construction and removed only with the approval of the Engineer.

**1.37 ENERGY INCENTIVES**

- A. The Contractor, his Subcontractors and Suppliers shall provide to the Owner all paperwork necessary to support the Owners pursuit of incentives related to energy conservation as provided by NYSERDA. This shall include at a minimum receipts for energy efficient equipment such as: lighting, motors, variable frequency drives, etc.

**1.38 INFECTION CONTROL**

- A. Construction procedures, temporary partitions, negative air systems, cleaning procedures, HVAC system isolation, dust control, etc. shall be in accordance with the infection control standards set forth by the Facility. A copy of the facilities standards are available from the Owner upon request.

**END OF SECTION**

**SECTION 26 05 01**  
**BASIC MATERIALS AND METHODS**

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**PART 1 - GENERAL**

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**1.1 DESCRIPTION**

- A. The drawings are diagrammatic, unless detailed dimensioned drawings are included, and show only approximate locations of equipment, fixtures, panelboards, conduits, and wiring devices. Exact locations are subject to the approval of the Owner's Representative. The general run of electrical feeders, branch circuits, and conduits, indicated on the drawings, is not intended to be the exact routing. Exact routings of conduit shall suit the job conditions.
- B. Circuit designations, in the form of "Home Runs" on branches, indicate the designation of the branch circuit, the size and the quantity of branch circuit conductors, and the panel board or interconnection box from which the branch circuit is served.
- C. Make measurements at the site and in the building during construction for all systems installed as the work progresses in such a manner that the equipment, piping, vents, ducts, conduit, and boxes will fit in the space available. Maintain headroom and if in unfinished areas, be as neatly installed, as obscure and "out-of-the-way" as physically possible. Where more than one trade is involved in an area, space or chase, all shall cooperate and install their own work to utilize the space equally between them in proportion to their individual requirements. In general, ductwork shall be given preference except where grading of piping becomes a problem, followed by piping then electrical wiring. If, after installation of any equipment, piping, ducts, conduit, and boxes, it is determined that ample maintenance and passage space has not been provided, rearrange work and /or furnish other equipment as required for ample maintenance space.
- D. Any changes in the size or location of the material or equipment supplied, which may be necessary in order to meet field conditions or in order to avoid conflicts between trades, shall be brought to the immediate attention of the Owner's Representative and approval received before such alterations are made.

**1.2 QUALITY ASSURANCE**

- A. Electric equipment shall be installed in a neat and workmanlike manner. All methods of construction, details of workmanship, that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative.
- B. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc., correspond to the nomenclature dictated by those manufacturers. Where "or equal" is stated, equipment shall be equal in every way to that of the equipment specified and subject to approval. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.

**1.3 SUBMITTALS**

- A. Submit product data for the following equipment, materials and products, including all fittings and accessories:
1. Conduit
  2. Surface Metal Raceway
  3. Expansion Fittings
  4. Wireway and Wire Trough
  5. Channel Support Systems
  6. Conductors
  7. Cables
  8. Terminal and Equipment Cabinets
  9. Wiring Devices Including Dimmers
  10. Telephone/Data Communication Outlets
  11. Occupancy Sensors
  12. Water Proofing Seals
  13. Flashing, Sealing, Firestopping Materials
  14. Salvageable Materials
  15. Testing reports prior to energizing equipment and materials.

**1.4 SALVAGEABLE MATERIALS**

- A. Salvageable materials will be reviewed and identified by the Owner. Items selected by the Owner shall be delivered to a selected location on the Owner's property by this contract in an equal condition to prior this work.
- B. Items normally accepted as salvage by the Owner:
1. Transformers
  2. Panelboards and covers
  3. Circuit breakers
  4. Disconnects (100 AMP and up)
  5. Motor starters
  6. Luminaires
  7. Motors above 1/2 HP and up

**PART 2 - PRODUCTS****2.1 MATERIALS**

- A. Conduit, Raceway and Tubing:
1. Rigid Metal Conduit shall be hot-dipped galvanized or electro-galvanized steel, UL listed "rigid metal conduit."
    - a. Acceptable Manufacturers:
      - 1) Republic Conduit
      - 2) Allied Tube and Conduit



- 3) Wheatland Tube Company
  - 4) Approved equal
2. Electrical Metallic Tubing shall be electro-galvanized steel; UL listed "electrical metallic tubing."
- a. Acceptable Manufacturers:
    - 1) Republic Conduit
    - 2) Allied Tube and Conduit
    - 3) Wheatland Tube Company
    - 4) Approved equal
3. Flexible Metal Conduit shall be constructed one continuous length of electro-galvanized, spirally wound steel strip with interlocking convolutions and interior surfaces free from burrs and sharp edges. Shall be UL listed "flexible metal conduit" or "liquidtight flexible metal conduit" as required.
- a. Acceptable Manufacturers:
    - 1) Republic Conduit
    - 2) Allied Tube and Conduit
    - 3) Wheatland Tube Company
    - 4) American Flexible Conduit Company
4. Rigid Non-Metallic Conduit (Schedule 40 for concrete encasement, Schedule 80 for direct burial or where exposed) shall be UL listed "rigid non-metallic conduit" for application in underground, encased, and exposed applications in accordance with Article 352 of the National Electrical Code. The conduit shall be made from polyvinyl chloride (PVC) and shall be rated for 90°C conductors. Conduit and fittings shall be tested in accordance with the testing requirements defined in NEMA TC-2, NEMA TC-3, UL-651 and UL-514.
- a. Acceptable Manufacturers:
    - 1) Carlon
    - 2) Heritage Plastics
    - 3) PW Eagle
5. Surface Non-Metallic Two Compartment Raceway shall be constructed of PVC material meeting UL flammability requirements, rated for 600 volts and UL listed.
- a. Ivory finish.
  - b. Provide with receptacles, telephone and data outlets as specified and shown on Drawings.
  - c. Provide with NEC required dividers.
  - d. Acceptable Manufacturers:
    - 1) Wiremold

- 2) Hubbell
  - 3) Panduit
6. Surface Metal Raceway shall be .040 in. steel UL listed "Surface Metal Raceway". Use manufacturer's standard fittings designed to be used with the specific raceway.
- a. One-Piece Raceway:
    - 1) Buff or ivory finish.
    - 2) Acceptable Manufacturers:
      - a) Wiremold "700" Series (Design Make)
      - b) Mono Systems
      - c) Approved equal
  - b. Two-Piece Prewired Raceways:
    - 1) Buff, gray, ivory or stainless steel finish.
    - 2) Wiring Harness:
      - a) Single circuit NEMA 5-15R, 15 ampere, 125 volt, grounded receptacles spaced 30 feet on centers.
    - 3) Acceptable Manufacturers:
      - a) Wiremold 2200 (Design Make)
      - b) Mono Systems
      - c) Approved equal
  - c. Two-Piece Raceways:
    - 1) Ivory finish.
    - 2) Duplex or special receptacles as specified in wiring devices.
    - 3) Corners, turns, tees and elbows shall have suitable turning radius for the intended cable.
    - 4) Provide divider in raceways utilized for power and communications. Utilize wire clips 18 inches on center to hold in the conductors/cables.
    - 5) Utilize rounded head screws for mounting.
    - 6) Acceptable Manufacturers:
      - a) Wiremold 2400, 3000, 4000 or 6000 (Design Make)
      - b) Mono Systems
      - c) Approved equal
7. Surface Aluminum Two Compartment Metallic Raceway shall be constructed of heavy #6063-T5 extruded aluminum, .080 in. wall thickness with a satin anodized finish.

- a. Provide with receptacles, telephone and data outlets as specified and shown on the Drawings.
  - b. Provide with NEC required dividers.
  - c. Acceptable Manufacturers:
    - 1) Wiremold
    - 2) Mono Systems
    - 3) Acceptable equal
8. Electrical Non-Metallic Tubing (ENT) for installation in accordance with the National Electrical Code, other applicable sections of the Code, and local codes.
- a. Any ENT used shall meet the requirements of NEMA TC-13 and shall be listed by Underwriters Laboratories, Inc., as suitable for its intended purpose.
  - b. ENT shall be recognized by a CABO National Evaluation Report for use in one (1) hour and two (2) hour rated construction.
  - c. Penetration of fire rated walls, floors or ceilings shall use classified Through-Penetration Firestop Systems described in the current Underwriters Laboratories Building Materials Directory.
  - d. Fittings and outlet boxes shall be designed for use with ENT and listed by Underwriters Laboratories. All fittings, boxes, and accessories shall be from one manufacturer.
  - e. Only cement recommended specifically for use with the brand of ENT used shall be used.
  - f. Unless indicated differently on drawings, ENT systems shall be color coded BLUE for branch and feeder circuit wiring, YELLOW for communications, and RED for fire alarm and emergency systems.
  - g. Acceptable Manufacturers:
    - 1) Carlon
    - 2) Heritage Plastics
    - 3) Approved equal

B. Conduit Fittings:

1. Fittings for rigid metal conduit shall be fully threaded and shall be of the same material as the respective raceway system. Fittings for electrical metallic tubing shall be single screw indenter fittings for conduits up to 2 in. and double screw indenter fittings for conduits 2 in. and larger. Connectors shall also have insulated throat up to and including 1 in. size. For sizes 1-1/4 in. and larger, provide plastic insulating bushing. Die-cast, pressure cast fittings shall not be used. Fittings for rigid non-metallic conduit shall be solvent cemented in accordance with the manufacturer's instructions.
  - a. Acceptable Manufacturers:
    - 1) O.Z. Gedney
    - 2) Steel City

- 3) Thomas & Betts
- 4) Crouse-Hinds
- 5) Carlon

2. Expansion Fittings shall be watertight, combination expansion and deflection type designed to compensate for movement in any direction. Fittings shall have flexible copper braid bonding jumpers, neoprene sleeve and stainless steel bands, use aluminum body fittings for rigid aluminum conduit.

a. Acceptable Manufacturers:

- 1) Crouse-Hinds, Type "DX"
- 2) O.Z./Gedney, Type "DX"
- 3) Approved equal

C. Wireway and Wire Trough:

1. Wireway and Wire Trough shall be hinged cover type wireway with provisions for full lay-in along the entire length of run. Wireway shall be steel, enclosed with gray enamel finish. Provide JIC sectional NEMA dust resistant, oil tight type where subjected to moisture, in Pump Rooms, Mechanical, Electric and Fan Rooms, exterior walls, Wood Shop, and Maintenance Shop, and similar locations. Size to meet NEC fill requirements or larger as noted on Contract Documents. Provide knockouts along runs. Recess in wall where required for flush mounted equipment. Provide all elbows, tees, pullboxes, fittings, hangers, reducers, supports, supports, etc., to meet installation requirements.

a. Acceptable Manufacturers:

- 1) Square D "Square Duct"
- 2) General Electric
- 3) Hoffman
- 4) Meco

D. Channel Support Systems:

1. Channel Support Systems shall be provided for racking of conduit, trapeze suspensions, equipment support, cable racks and panel racks. Provide poured-in-place inserts for supporting channels at poured concrete walls and ceilings. Channel shall be steel with electroplated zinc finish for interior dry locations. Provide necessary accessories such as bolts, screws, anchors, connection plates, and straps as required to perform the necessary functions. Wet location and exterior channel support systems shall be steel with hot dipped galvanized finish and stainless steel hardware as a minimum. Cut ends shall be touched up with suitable matching finish.

a. Acceptable Manufacturers:

- 1) Unistrut

- 2) Globe
- 3) Kindorf
- 4) B-Line

E. Conductors and Cables:

1. Conductors shall be insulated for 600 volts, unless otherwise noted, and shall be standard AWG and kcmil sizes. Conductors shall be 98 percent copper, thermal plastic or cross-linked polymer insulated, heat and moisture resistant. Conductor sizes No. 18 AWG and smaller shall be a solid single strand; No. 16 AWG and larger shall be multiple stranded. Minimum conductor size shall be #12 AWG except smaller sizes may be used for communications and special systems. Conductor sizes shall be as called for. Conductors shall be labeled with UL seal and be marked with the manufacturer's name, wire size and insulation type. Insulation for all 600 volt conductors shall be Type THHN/THWN-2 for conductor sizes #8 AWG and smaller or Type XHHW-2 for conductor sizes #6 AWG and larger, unless otherwise noted. All exterior and underground conductors shall be XHHW-2. Luminaire fixture wire shall conform to the latest Underwriters Laboratories requirements. Flexible cords and cables for general portable use shall be Type SO or SOOW or as noted. Cables for special use shall be of the type specified for the application.

a. Color Coding:

- 1) All circuits shall be color coded according to the following schedule.

	Three Phase 120/208V 240V	Three Phase 277/480V	Single Phase 120/240V
Ground	Green	Green	Green
Neutral	White	Gray	White
A or L1	Black	Brown	Black
B or L2	Red	Orange	Red
C or L3	Blue	Yellow	---

b. Acceptable Manufacturers:

- 1) General Cable
- 2) Prysmian
- 3) South Wire
- 4) Okonite
- 5) Senator

2. Metal Clad, Type "MC" Cable shall consist to thermal plastic insulated copper conductors of size and quantity indicated, protected by a positive interlocked armor of galvanized steel. The conductors shall be twisted together and shall have an overall moisture and fire resistant fibrous covering. The cable shall provide an adequate path for equipment



grounding as required by the NEC and have an integral green insulated full size equipment grounding conductor running its entire length. The cable shall meet the requirements of the NEC for "Type MC" Metal Clad Cable and shall bear the UL Label.

a. Acceptable Manufacturers:

- 1) Southwire
- 2) AFC Cable
- 3) Approved equal

3. Armored Cable, Type AC, shall consist of thermal plastic insulated copper conductors of size and quantity indicated, protected by a positive interlocked armor of galvanized steel. The conductors shall be twisted together and shall have an overall moisture and fire resistant fibrous covering. The cable shall have an internal bonding strip of copper or aluminum in contact with the armor for the entire length of the cable. The cable shall meet the requirements of the NEC for "Type AC" Armored Cable and shall bear the UL label.

a. Acceptable Manufacturers:

- 1) Southwire
- 2) AFC Cable
- 3) Approved equal

F. Cable Termination Kits:

1. The shielded power cable termination shall be capable of continuous operation at the rated voltage of the cable it is to be used on, up to 35 kV. It must be rated for continuous operation at 90°C, with an emergency overload temperature rating of 130°C. The termination shall meet the requirements of IEEE Standard 48, for a Class 1 Termination. It shall be a one-piece design, where high-dielectric constant (capacitive) stress control is integrated within a skirted insulator made of silicone rubber, munsel gray in color. The termination shall not require heat or flame for installation. The termination kit must contain all of the necessary materials required to make three terminations (except for the lugs). In addition to normal locations, the termination must be designed for contaminated indoor and outdoor locations.
2. Acceptable Manufacturers:
  - a. 3M Brand
  - b. Elastimold
  - c. Raychem
  - d. Approved equal

G. Separable Splices/Apparatus Connections:

1. The shielded power cable separable insulated connector splice or 600 Amp apparatus connection shall be capable of continuous operation at 35 kV, 600 amps and 90°C, with an emergency overload temperature rating of 130°C. The system and components shall meet the requirements of ANSI/IEEE dead-break interfaces. The elbow (tee-module) and all other rubber components shall be made of peroxide cured EPDM rubber, and the connecting components shall be insulated with molded epoxy. The system shall be available as specific kits for splicing, tapping (adding-on), dead-ending and apparatus connecting. Provide with test point for apparatus connection.
  - a. Acceptable Manufacturers:
    - 1) 3M Brand w/Grounding Kit
    - 2) Elastimold w/Grounding Kit
    - 3) Raychem
    - 4) Approved equal

H. Permanent Splices:

1. The shielded power cable splice must meet the requirements of ANSI/IEEE and meeting the cable voltage rating. It must be rated for continuous operation at 90°C, with an emergency overload rating of 130°C. The splice shall be made of peroxide cured EPDM rubber. The splice kit must contain all of the necessary materials required to make one inline splice (except for the connector), including a solderless mechanical ground jumper. The splice shall be designed for splicing tape shielded, wire shielded, and UniShield cables without the requirement of additional adapters. It shall be rated for indoor, outdoor and direct burial applications.
2. Acceptable Manufacturers:
  - a. 3M Brand
  - b. Elastimold
  - c. Raychem
  - d. Approved equal

I. Terminal Lugs and Connectors:

1. The copper lug shall be capable of continuous operation at the current rating of the cable it is used on. The lug shall be UL listed per UL 486A, using industry standard crimping tools and dies. Terminal lugs shall be solderless, pressure type with UL label for "CU/AL" conductor terminations. The lug shall be a closed-end compression (crimp) type, constructed of seamless, tin-plated copper. The lug shall be made with a chamfered inside end, for ease of conductor insertion. Both one and two hole lugs shall be NEMA sized for standard stud sizes and spacing. The lug shall be designed for use at voltages up to 35 kV.

- a. Acceptable Manufacturers:
  - 1) 3M Scotchlok 30,000 and 31,000 Series
  - 2) Burndy
  - 3) O.Z./Gedney
  - 4) Thomas and Betts
  
2. The copper conductor connection shall be capable of continuous operation at the current rating of the cables it is used on. The connection shall be UL listed per UL 486A, using industry standard crimping tools and dies. The connector shall be an inline compression (crimp) type, constructed of seamless, tin-plated copper. The connector shall be constructed with chamfered inside-ends and with center cable stops. The connector shall be designed for use at voltages up to 35 kV.
  - a. Acceptable Manufacturers:
    - 1) 3M Scotchlok 10,000 and 11,000 Series
    - 2) Burndy
    - 3) O.Z./Gedney
    - 4) Thomas and Betts
  
3. "Split-bolt" Connectors shall be solderless type.
  - a. Acceptable Manufacturers:
    - 1) Burndy
    - 2) Kearney
    - 3) O.Z./Gedney
    - 4) Thomas and Betts
    - 5) Anderson
  
4. "TWIST ON" Connectors shall be spiral steel spring type and insulated with vinyl cap and skirt.
  - a. Acceptable Manufacturers:
    - 1) 3-M Company "Scotch-Lok"
    - 2) Ideal "Wing-Nuts"
    - 3) Approved equal
  
- J. Boxes:
  1. Outlet boxes shall be galvanized steel, not less than 2-1/2 in. deep, unless restricted by the surroundings, 4 in. square or octagonal, with knockouts. Boxes and associated fittings, plates and devices shall be mechanically fastened (screwed), friction fitting is not acceptable. Outlet boxes exposed to moisture, exterior, wet or damp locations shall be cadmium cast alloy complete with external threaded hubs and gasketed screw fastened covers. Minimum box size shall be as indicated in the NEC for the conductors and devices installed. Boxes shall be approved for the environmental condition where they will be installed.



## a. Acceptable Manufacturers:

- 1) Steel City
- 2) Raco
- 3) Appleton
- 4) Crouse Hinds

## 2. Telephone/Data Communications Outlet Boxes:

- a. 4 in. x 4 in. outlet box with single gang plaster ring with cover plate suitable for indicated communications outlet and conduit routed to accessible ceiling space. Cover plate shall match the receptacle cover type.

3. Pull and junction boxes shall be constructed of not less than 14 gauge galvanized steel with trim for flush or surface mounting in accordance with the location to be installed. Provide screw-on type covers. Boxes installed in damp or wet locations shall be of raintight construction with gasketed cover and threaded conduit hubs. In no case shall boxes be sized smaller than as indicated NEC for conduit and conductor sizes installed. Boxes shall be approved for the environmental condition of the location where they will be installed.

## a. Acceptable Manufacturers:

- 1) Hoffman
- 2) Keystone
- 3) Approved equal

## K. Terminal and Equipment Cabinets:

1. Terminal and equipment cabinets shall be code gauge galvanized steel with removable endwalls. Fronts shall be of code gauge steel, flush or surface type (as indicated) with concealed trim clamps, concealed hinges, flush lock, and grey baked enamel finish. Boxes and front shall be UL listed and shall be minimum 35 in. H x 24 in. W x 6 in. D. Provide removable insulated plywood terminal board mounted on inside back wall of cabinet.

## a. Acceptable Manufacturer:

- 1) Square D "Mono-Flat"
- 2) Approved equal

## L. Wiring Devices:

1. Wiring Devices (toggle switches, key switches, receptacles, dimmers, occupancy sensors, etc.) shall be specification grade as a minimum. Switch handle and receptacle face shall be as directed by the Owner's Representative. Provide device cover plates of satin finish type 302 stainless steel in finished areas and rounded raised (Steel City 450/460 series) only for surface mounted locations in unfinished areas. Provide neoprene

gasketed cast aluminum/zinc box with hinged rain tight cast aluminum/zinc lockable while in use cover with stainless steel hardware for devices designated "WP".

a. Acceptable Manufacturers:

- 1) Pass and Seymour
- 2) Hubbell
- 3) Leviton

2. Toggle/Snap Switches:

- a. Units shall be quiet operation, quick make/quick break, rated for 20A/120-277V/1hp at 120/277V, **side/back wired, 90° rear plug in termination with pig tail**, with nylon/polycarbonate toggle, self grounding mounting screw clip plate (not staple), ground terminal and silver alloy contacts. Units shall meet latest Federal Specification WS-896, NEMA WD-1 and UL Test 20. Single pole units shall be Hubbell HBL1221, P&S 20AC1 or Leviton 1221-2. Provide two pole, three way, four way, lighted handle, keyed, etc. type of the same quality and model.
- b. Momentary Contact: Units shall be as indicated above (20A, 277V, nylon handle, side/back wired), three position, two circuit/three wire with spring return to center position, provide where indicated and as needed for proper system operation. Hubbell HBL 1557, P&S 1250, Leviton 1256 or approved equal. Provide keyed operation or pilot light where indicated.

3. Receptacles:

- a. Provide receptacles where indicated on the drawings and where called for. Provide type receptacle as indicated and if not indicated then utilize general receptacle.
- b. General Receptacle: Units shall be NEMA 5-20R, duplex, 20A, 125V, side/back wired, #14 to 10AWG screw terminals with nylon face, indented brass contacts for three point connection, self grounding mounting screw clip plate (not staple), ground terminal Meet requirements of Federal Specification W-C-596, NEMA WD-6 and UL 498.
  - 1) Units shall have brass mounting strap and be: Hubbell HBL5362, P&S 5362AX or Leviton 5362.
- c. Ground Fault Interrupting Receptacles: Units shall be as specified above for General Receptacle and have 5mA interrupting ground fault level, test/reset front buttons, full through feed capability, power off on reverse wired sensing, 10kA short circuit current rating, be tamper/weather resistant and in compliance with UL 943. Unit shall self-test function to periodically test the components automatically and indicate a failure condition utilizing an LED. Shall be Hubbell GFTR20, P&S 2095TR or Leviton 7599TR. FOR SELF TEST

- d. Tamper Resistant Receptacles: Units shall be as specified above for General Receptacle and have protective shutters to prevent entry into the line or grounded front openings unless all plug prongs are present. Shall be Hubbell BR20TR, P&S TR5362 or Leviton 6362TR.
4. Lighting Dimmers:
- a. Provide lighting dimmer where indicated suitable for the type of luminaire for even continuous control. Unit shall be rated for the indicated connected load plus 25% minimum (even when ganged). Review luminaire schedule for type and loading. Provide for three-way control as indicated.
  - b. Dimmers to be Lutron "Nova" NT-(1000W minimum) with debuzzing coil for incandescent.
  - c. Low voltage dimming shall be as recommended by the luminaire manufacturer for magnetic or solid state.
  - d. LED dimmers shall be as recommended by the luminaire manufacturer and be listed for use with the associated driver.
  - e. Device color shall match the toggle switch.
  - f. Acceptable Manufacturers:
    - 1) Lutron
    - 2) Approved Equal
5. Emergency Shutdown Pushbutton:
- a. Where called for provide emergency shutdown/emergency power off push button. Unit shall be Square D Class 9001 Type K NEMA 13 oil tight pushbutton with the following:
    - 1) Red mushroom head button, hinged protective flip up cover, push to operate, pull to reset.
    - 2) Maintained contact operation.
    - 3) Red pilot light.
    - 4) Engraved legend plate indicating "XX - Emergency Stop" with XX = the system name.
6. Occupancy/Vacancy Sensors:
- a. Sensors shall comply with the following as a minimum:
    - 1) Zero crossing switching operation (switch on/off only where sine wave is at zero volts) suitable for linear, non-linear and electronic/magnetic fluorescent ballasts for the loads indicated. Where the load to be controlled exceeds the sensor load rating provide a separate relay of adequate rating.
    - 2) Failure of the unit shall be to the on/closed position or manual operation.

- 3) Motion sensitivity adjustment (dip switch or dial) and time delay adjustment (5 to 30 minutes minimum, dip switch or dial).
- 4) Line voltage input and switching. Field selectable for 120 or 277 VAC, 60 Hz.
- 5) UL listed and have a five year manufacturer full replacement warranty.
- 6) Test mode feature to override the set time delay to allow adjusting of the sensitivity.
- 7) Sensor locations shall be adjusted during construction and at occupancy as recommended by the manufacturer for optimal sensing and operation.
- 8) Operation shall have adjustable time delay. Occupancy sensors shall have automatic on and vacancy sensors shall have manual on.
- 9) Adjustable controls/settings shall only be accessible when the front cover is removed or from the back of the unit.
- 10) Unit color shall match the project devices except for the ceiling mounted units which shall match the ceiling color. All color selections shall be by the Architect.
- 11) Ultrasonic sensing shall not be affected by air movement and shall operate at 32 kHz minimum (shall not interfere with hearing aids or other equipment).
- 12) Provide components as needed for the indicated control.
- 13) A factory authorized representative shall coordinate and instruct the start up services of the sensors providing placement recommendations, connection guidance and start up supervision and adjustment.

b. Wall Mounted - Passive Infrared (PIR):

- 1) Unit shall fit into a standard single gang electrical box, have an on/off button and utilize PIR technology motion sensing. Selectable manual or automatic on mode.
- 2) Minimum Switching Capacity: 120 V - 800 W, 277 V - 1200 W.
- 3) The sensing shall be 180° and the sensitivity area to be a minimum of:
  - a) Major Motion (Walking/Arm Wave): 35 ft. x 30 ft.
  - b) Minor Motion (Small Motion at Desk): 20 ft. x 15 ft.
- 4) Ambient light level sensing (adjustable 20-300 fc) to prevent "on" operation when the ambient light level is greater than the set point level.
- 5) High impact resistant sensor lens.
- 6) Acceptable Manufacturers:
  - a) Pass & Seymour Model OS300S (Design Make)
  - b) Hubbell

- c) Watt Stopper
- d) Sensor Switch

c. Wall Mounted - Dual Technology (PIR and Ultrasonic):

- 1) Unit shall fit into a standard single gang electrical box, have an on/off button and utilize PIR and ultrasonic technology motion sensing. Both types of sensing are needed for contact closure but only one is needed to keep it closed. Selectable manual or automatic on mode.
- 2) Minimum Switching Capacity: 120 V - 800 W, 277 V - 1200 W.
- 3) The sensing shall be 180° and the sensitivity area to be a minimum of:
  - a) Major Motion (Walking/Arm Wave): 35 ft. x 30 ft.
  - b) Minor Motion (Small Motion at Desk): 20 ft. x 15 ft.
- 4) Ambient light level sensing (adjustable 20-300 fc) to prevent "on" operation when the ambient light level is greater than the set point level.
- 5) High impact resistant sensor lens.
- 6) Acceptable Manufacturers:
  - a) Hubbell Model AD2000 (Design Make)
  - b) Watt Stopper
  - c) Cooper
  - d) Sensor Switch

d. Wall Mounted - Dual Technology - Dual Switching:

- 1) Unit shall fit into a standard single gang electrical box, have two on/off buttons and utilize PIR and ultrasonic technology motion sensing. Both types of sensing are needed for contact closure but only one is needed to keep it closed. To have two contacts each fully rated, electrically separate and be commonly controlled. Selectable manual or automatic on mode.
- 2) Minimum switching capacity: 120 V - 800 W, 277 V - 1200 W.
- 3) The sensing shall be 180° and the sensitivity area to be a minimum of:
  - a) Major Motion (Walking/Arm Wave): 35 ft. x 30 ft.
  - b) Minor Motion (Small Motion at Desk): 20 ft. x 15 ft.
- 4) Ambient light level sensing (adjustable 20-300fc) to prevent "on" operation when the ambient light level is greater than the set point level.
- 5) High impact resistant sensor lens.

- 6) Acceptable Manufacturers:
- a) Hubbell Model AD2000X2 (Design Make)
  - b) Watt Stopper
  - c) Cooper
  - d) Sensor Switch

e. Ceiling Mounted - Occupancy Sensor - Ultrasonic:

- 1) Unit shall mount to standard octagonal box, have adjustable sensitivity/time delay, have auxiliary contact (form C, 0.5A at 24 VDC) and utilize ultrasonic sensing. Auxiliary contact shall indicate movement sensing and be programmable to utilize time delay or not.
- 2) Shall have self contained rated contacts or control a separate switch pack. If a self contained unit then the ratings and function shall meet or exceed the switch pack specifications.
- 3) Sensing shall be 360° with a minimum operating area of:
  - a) Major Motion (Walking/Arm Wave): 50 ft. x 30 ft.
  - b) Minor Motion (Small Motion at Desk): 40 ft. x 20 ft.
  - c) Corridor (Major Motion): 50 ft. x 16 ft.
- 4) Units shall be suitable for overlap of motion detection areas without reduction in spacing and false operation.
- 5) Sensing shall be suitable for a ceiling/mounting height of up to 12 ft. minimum.
- 6) The maximum depth shall be 1.5 in. below the ceiling/box.
- 7) Acceptable Manufacturers:
  - a) Hubbell Model ATU2000CRP (design make)
  - b) Watt Stopper
  - c) Cooper
  - d) Sensor Switch

f. Ceiling Mounted - Occupancy Sensor - Dual Technology:

- 1) Unit shall mount to standard octagonal box, have adjustable sensitivity/time delay, have auxiliary contact (form C, 0.5A at 24 VDC) and utilize PIR and ultrasonic technology motion sensing. Both types of sensing are needed for contact closure but only one is needed to keep it closed. Auxiliary contact shall indicate movement sensing and be selectable to utilize time delay or not.
- 2) Shall have self contained rated contacts or control a separate switch pack. If a self contained unit then the ratings and function shall meet or exceed the switch pack specifications.
- 3) Sensing shall be 360° with a minimum operating area of:
  - a) Major Motion (Walking/Arm Wave): 50 ft. x 30 ft.

- b) Minor Motion (Small Motion at Desk): 40 ft. x 20 ft.
  - c) Corridor (Major Motion): 50 ft. x 16 ft.
- 4) Units shall be suitable for overlap of motion detection areas without reduction in spacing and false operation.
  - 5) Sensing shall be suitable for a ceiling/mounting height of up to 12 ft. minimum.
  - 6) The maximum depth shall be 1.5 in. below the ceiling/box.
  - 7) Acceptable Manufacturers:
    - a) Hubbell Model ATD2000CRP (design make)
    - b) Watt Stopper
    - c) Cooper
    - d) Sensor Switch
- g. Ceiling Mounted - Vacancy Sensor - Dual Technology:
- 1) Unit shall mount to standard octagonal box, have adjustable sensitivity/time delay, have auxiliary contact (form C, 0.5A at 24 VDC) and utilize PIR and ultrasonic technology motion sensing. Both types of sensing are needed for contact closure but only one is needed to keep it closed. Operation shall require manual operation of momentary wall switch for lighting to be switched on and automatic off. Auxiliary contact shall indicate movement sensing and be selectable to utilize time delay or not.
  - 2) Shall have self contained rated contacts or control a separate switch pack. If a self contained unit then the ratings and function shall meet or exceed the switch pack specifications.
  - 3) Sensing shall be 360° with a minimum operating area of:
    - a) Major Motion (Walking/Arm Wave): 50 ft. x 30 ft.
    - b) Minor Motion (Small Motion at Desk): 40 ft. x 20 ft.
    - c) Corridor (Major Motion): 50 ft. x 16 ft.
  - 4) Units shall be suitable for overlap of motion detection areas without reduction in spacing and false operation.
  - 5) Sensing shall be suitable for a ceiling/mounting height of up to 12 ft. minimum.
  - 6) The maximum depth shall be 1.5 in. below the ceiling/box.
  - 7) Provide momentary switch(s) and any other needed equipment for indicated operation.
  - 8) Acceptable Manufacturers:
    - a) Hubbell Model ATD2000CRP (design make)
    - b) Watt Stopper
    - c) Cooper
    - d) Sensor Switch

## h. Switch Pack:

- 1) Provide a minimum of one (1) switch pack for each ceiling mounted occupancy sensor. Provide additional units for multiple circuits (quantity to match the quantity of circuits).
- 2) Unit shall be plenum rated with line voltage side into a metallic box.
- 3) Low voltage power shall be suitable for a minimum of three (3) occupancy sensors. Multiple sensors shall be able to control a single switch pack.
- 4) Minimum switching capacity shall be 20A (all types of loads) at 120/277VAC.

## i. Testing:

- 1) Each occupancy sensor shall be fully tested for proper operation of all functions after installation.
- 2) Testing shall include sensitivity, time delay, ambient lighting level, etc.
- 3) Operation and settings shall be acceptable to the Owner.

## M. Waterproofing Seals:

1. Provide expanding link type seal, for installation between duct/conduit, and sleeve or core-drilled hole in concrete.
2. Make: Link Seal, manufactured by Thunderline Corp., **or approved equal.**

## N. Flashing, Sealing, Fire-stopping:

1. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:
  - a. Provide materials and products listed or classified by an approved independent testing laboratory for "Through-Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Through-Penetration Fire-Stops" designated ASTM E814.
  - b. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
  - c. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
  - d. The methods used shall incorporate qualities, which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.



2. Acceptable Manufacturers:
  - a. Dow Corning Fire-Stop System Foams and Sealants
  - b. Nelson Electric Fire-Stop System Putty, CLK and WRP
  - c. S-100 FS500/600, Thomas & Betts
  - d. Carborundum Fyre Putty
  - e. 3-M Fire Products

## 2.2 WIRE GUARD

- A. Where specified herein or shown on the drawings provided a wire guard for devices or equipment. Units shall be custom as needed for the application.
- B. Wire guard shall be a minimum #6 wire gage of zinc plated steel, overall clear coating and welded at joints. For any unit needing access it shall have an integral hinge and locking means.
- C. Wires shall have 2 inch maximum spacing.
- D. Acceptable Manufacturers:
  1. Design Make: American Time and Signal
  2. Approved equal

## PART 3 - EXECUTION

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### 3.1 INSTALLATION

- A. Unless otherwise noted, wiring for all systems indicated in the contract documents shall consist of insulated conductors installed in raceways. Raceways shall be continuous from outlet box to outlet box and from outlet box to cabinet, junction or pull box. Secure and bond raceways to all boxes and cabinets so that each system of raceways is electrically continuous throughout. Unless otherwise indicated on the drawings, install all wiring in the following raceway system:
  1. Wiring 600 Volts or Less in Dry Locations: Electrical metallic tubing.
  2. Wiring 600 Volts or Less in Outdoors, Above Grade Locations: Rigid metal conduit.
  3. Wiring 600 Volts or Less Installed Below Grade, in Concrete Floor Slabs or Below Ground Floor Slab: Rigid non-metallic conduit encased in concrete with rigid metal conduit bends and penetrations through building floors and walls.
  4. All Wiring Installed in Hazardous Locations: Galvanized rigid metal conduit.
  5. All Wiring Installed in Corrosive Locations: Schedule 80 rigid non-metallic conduit.
  6. Flexible metal conduit shall be used for final connection to all motors, final connection to rotating or vibrating equipment, final connections to dry type transformers and final connections to recessed lighting fixtures. Liquidtight flexible conduit shall be used in all wet or damp locations. Maximum length of flexible conduit shall be 36 in., except that from outlet boxes to lighting fixture maximum length shall be 6 ft. Provide green insulated equipment grounding conductor in all flexible metal conduit.

7. Surface metal raceway may be used for surface runs in finished area where concealed conduit cannot be run or where specifically indicated on drawings.

B. Raceways:

1. Sized as indicated on the drawings. Where sizes are not indicated, raceways shall be sized as required by the National Electrical Code in accordance with the quantity, size, and type of the insulation conductors to be installed. Raceways shall be minimum 1/2 in. trade size for branch circuit wiring and minimum 3/4 in. trade size for all telephone intercommunications, instrumentation, fire alarm, television and computer systems and for all branch circuit "Home Runs" to panelboards.
2. Installed to provide adequate grounding between all outlets and the established electrical system ground.
3. Cut square, free of burrs due to field cutting or manufacture, and bushed where necessary.
4. Installed with exterior surfaces not less than 6 in. from any surface with normal operating temperature of 200°F or higher.
5. Plugged at the ends of each roughed-in raceway with an approved cap or disc to prevent the entrance of foreign materials during construction.
6. Concealed throughout except where exposure is permitted by the Owner's Representative. All exposed raceways shall be painted to match existing adjacent surface finish as directed by the Architect.
7. Installed parallel or perpendicular to floors, walls and ceilings where exposed wiring is permitted.
8. Installed with a minimum of bends and offsets. All bends shall be made without kinking or destroying the cross section contour of the raceway. Factory made bends are acceptable and should be considered for raceways larger than 2".
9. Installed with UL approved rain-tight and concrete-tight couplings and connectors.
10. Firmly fastened within 3 ft. of each outlet box, junction box, cabinet or fitting. Raceways shall not be attached to or supported by wooden plug anchors or supported from mechanical work such as ductwork, piping, etc.
11. Installed with a #14 AWG fish wire in all telephone, intercommunication, "Spare" or "Empty" conduit runs to facilitate future installation of conductors.
12. Installed with expansion fittings at all building expansion joints such that no undue stress is placed on any electrical raceway due to the proper functioning of expansion joints.
13. Arranged in a neat manner for access and allow for access to work installed by other trades.
14. Raceways installed in concrete slabs shall be located so as not to affect structural integrity of slab, and such that conduit shall have a minimum of one inch of concrete cover on all sides. Obtain approval from the Owner's Representative prior to installing conduit larger than 1 in. trade size in concrete slabs. Raceways in slabs shall be for floor box use only.

15. Raceways installed below ground floor slab shall be encased in 6 in. minimum below slab with pea stone (NYSDOT 0702-0203) all sides. Where possible, install conduit directly below slab with concrete envelope poured monolithic with slab. Where this is not possible, support raceways and envelop maximum 5 ft. - 0 in. on centers from underside of structural slab by means of galvanized pipe hangers. Pipe hangers shall be coated with asphalt mastic. Installation shall maintain integrity of waterproofing membrane.
16. If it is necessary to burn holes through webs of beams or girders, call such points to the attention of the Owner's Representative and receive written approval both as to location and size of hole before proceeding with work. All holes shall be burned no larger than absolutely necessary.
17. Become familiar with the general construction of the building and place sleeves, inserts, etc., as required. All penetrations through existing floors shall be core drilled and sleeved.
18. Wherever a cluster of four (4) or more raceways rise out of floor exposed, provide neatly formed 6 in. high concrete envelop, with chamfered edges, around raceways.
19. All raceways shall be supported adequately by malleable iron pipe clamps or other approved methods. In exterior or wet locations, supports shall allow not less than 1/4 in. air space between raceway and wall. Firmly fasten raceway within 3 ft. of each outlet box, junction box, cabinet or fitting. The following table lists maximum spacing between conditions, strength of supporting members, etc.
20. Furnish and install such supports at no additional cost to owner.

Conduit Trade Size	Type of Run	Horizontal Spacing in Feet	Vertical Spacing in Feet
1/2 in., 3/4 in.	Concealed	7	10
1 in., 1-1/4 in.	Concealed	8	10
1-1/2 in. and larger	Concealed	10	10
1/2 in., 3/4 in.	Exposed	5	7
1 in., 1-1/4 in.	Exposed	7	8
1-1/2 in. and larger	Exposed	10	10

21. Where raceways puncture roof, install pitch pockets as required in order that the roof warranty is maintained. Coordinate with representative of roofing material manufacturer.
22. At each flush mounted panelboard, terminal cabinet, control cabinet, etc., provide four (4) spare 3/4 in. raceways from panelboard, etc., to an area above the nearest accessible ceiling space. Make 90° turn above the ceiling, arranged for further continuation of raceway, and cap.
23. Provide a bushing at each conduit termination unless fitting at box where conduit terminates has hubs designed in such a manner to afford equal protection to conductors. Provide grounding type insulated bushings on all conduit sizes 1-1/4 in. trade size and larger, and on all feeder raceways regardless of size. Provide standard bushings for conduits 1 in. and smaller unless otherwise stated.

24. Differing Temperatures: For raceways routed between areas with differing temperatures (interior to exterior, walk in coolers/freezers, environmental chambers, etc.) install raceway as follows:
  - a. Provide a thermal break, 6 in. minimum of stainless steel conduit within space wall/separation.
  - b. Seal raceway penetration through the wall/separation.
  - c. Provide a box on each side of the space wall/separation.
  - d. Provide raceway interior sealant (duct seal or suitable foam) to provide a complete air barrier after conductors are installed.
  - e. Mounting of raceway and boxes on equipment shall be coordinated and approved by the equipment manufacturer.
25. Raceway installed in wet, damp or exterior walls shall have a spacer provided to maintain a space/void between the mounting surface and the raceway.

C. Wiring Methods:

1. Conductors shall not be installed until raceway system, including all outlets, cabinets, bushings and fittings, is completed. Verify that all work of other trades which may cause conductor damage is completed. Use only U.L. approved cable lubricants when necessary. Do not use mechanical means to pull conductors No. 8 or smaller.
2. In general, conductors shall be the same size from the last protective device to the load.
3. All wiring systems shall be properly grounded and continuously polarized throughout, following the color-coding specified. Connect branch circuit wiring at panelboards, as required, in order to provide a "balanced" three-phase load on feeders.
4. Provide insulated green ground conductor in each branch circuit.
5. All feeder connections shall be made to bus and other equipment using solderless, pressure type terminal lugs.
6. For splices and taps, No. 10 AWG and smaller, use solderless "twist on" connectors having spiral steel spring and insulated with a vinyl cap and skirt.
7. For splices and taps, No. 8 and larger, use insulated solderless set screw AL/CU or hydraulically compressed sleeve fittings suitable for the intended use.
8. Use cast connections for ground conductors.
9. Provide minimum six inches of spare/slack of each conductor in each junction or pull box and termination.
10. Make all splices and connections in accessible boxes and cabinets only.
11. Cover uninsulated splices, joints, and free ends of conductor with rubber and friction tape or PVC electrical tape. Plastic insulating caps may serve as insulation. Heat shrink sleeves shall be acceptable for crimp type splices.
12. On termination at branch circuit outlets, leave a minimum of 8 in. free conductor for installation of devices and fixtures.

13. Feeder conductors shall be continuous from point of origin to load termination without splice. If this is not practical, contact the Owner's Representative and receive written approval for splicing prior to installation of feeder(s). Where feeder conductors pass through junction and pull boxes, bind and lace conductors of each feeder together. For parallel sets of conductors, match lengths of conductors as near equal as possible.
14. Branch circuit conductors installed in panelboards, and control conductors installed in control cabinets and panels shall be neatly bound together using "Ty-Raps" or equal.
15. Provide conduit seals and explosion proof devices as indicated on the plans and as dictated by the NEC for all hazardous locations indicated on the drawings.
16. Lighting fixtures, detectors, etc., in mechanical equipment, boiler and pump rooms shall be installed with exposed wiring after equipment, ductwork, piping, etc., are in place. In general, lighting shall be as located on the drawings; where conflicts exist, locate lights for best distribution.
17. Fire proof tape all medium voltage cables in handholes, man holes, building entrance and junction/pull boxes.
18. Provide cable/conductor vertical support in accordance with the NEC.

D. Outlet Boxes:

1. Consider location of outlets shown on drawings as approximate only. Study architectural, process piping, mechanical, plumbing, structural, roughing-in, etc., drawings and note surrounding areas in which each outlet is to be located. Locate outlet so that when fixtures, motors, cabinets, equipment, etc., are placed in position, outlet will serve its desired purpose. Where conflicts are noted between drawings, contact Owner's Representative for decision prior to installation. Comply with the NEC relative to position of outlet boxes in finished ceilings and walls.
2. Prior to installation, relocate any outlet location a distance of five feet in any direction from location indicated on drawings if so directed by the Owner's Representative. Prior to completion of wall construction, adjust vertical height of any outlet from height indicated if so directed by Owner's Representative. The above modifications shall be made at no additional cost to the Owner.
3. Where outlets at different mounting heights are indicated on drawings adjacent to each other (due to lack of physical space to show symbol on drawings), install outlets on a common vertical line.
4. Where switch outlets are shown adjacent to strike side of door, locate edge of outlet box approximately 3 in. from door frame.
5. Outlet boxes in separate rooms shall not be installed "back-to-back" without the approval of the Owner's Representative.
6. Outlet boxes shall be sized to accommodate the wiring, splices and device(s) to be installed in accordance with the NEC.
7. Outlet boxes installed in plaster, gypsum board or wood paneled hollow cavity walls shall be installed flush with raised plaster covers or raised tile covers. Boxes shall be mechanically fastened and supported by two (2) adjacent structural members (studs) with cross brackets (Garvin Industries Model BMB or approved equal).

8. Outlet boxes installed in tile, brick or concrete block walls shall be installed flush and have extra-deep type raised tile covers or shall be 3-1/2 in. deep boxes with square corners and dimensions to accommodate conductors installed.
  9. Surface ceiling mounted outlet boxes shall be minimum 4 in. square, 1-1/2 in. deep, galvanized sheet metal.
  10. Surface wall mounted outlet boxes shall be cast type boxes.
  11. Floor outlet boxes shall be installed flush with finished floor, adjust level and tile as required. Where finished floor is terrazzo, provide boxes specifically designed for installation in terrazzo. Where floors are to receive carpet or flooring material, coordinate with appropriate trade and provide insert. Rectangular covers shall be parallel and perpendicular with the building and, if used, floor tile/floor joints/pattern. Coordinate cover type with the flooring and device type.
  12. Install a device cover plate over each and every outlet indicated on drawings. Do not install plates until painting, cleaning and finishing of surfaces surrounding the outlet are complete. Install single one-piece multi-gang covers over multi-gang devices.
- E. Receptacles:
1. Provide 20 ampere 125 volt, duplex receptacles unless noted otherwise on the Drawings.
  2. Provide hospital grade receptacle for all hospital construction.
- F. Toggle Switches
1. Switches shall be installed in accessible locations near room/space entryway(s).
  2. Provide lighted handle switches in mechanical rooms, elevator pits, electric rooms, etc.
- G. Junction and Pull Boxes:
1. Install junction and pull boxes in readily accessible locations. Access to boxes shall not be blocked by equipment, piping, ducts and the like. Provide all necessary junction or pull boxes required due to field conditions and size as require by the National Electrical Code.
- H. Equipment Mounting Heights:
1. Unless otherwise noted, mount devices and equipment at heights measured from finished floor to device/equipment centerline as follows:
 

a. Toggle switches (up position "on")	46 in.
b. Receptacle outlets (long dimension vertical, ground" pole farthest from floor)	18 in.
c. Receptacle outlets above counters	8 in. above counters

- |    |  |        |
|----|--|--------|
| d. | Receptacle outlets, above hot water or steam baseboard heaters. Do not install receptacle outlets above electric baseboard heaters | 30 in. |
| e. | Receptacle outlets, hazardous areas; also for refrigerators  | 48 in. |
| f. | Receptacle outlets, weatherproof, above-grade  | 24 in. |
| g. | Telephone outlets  | 18 in. |
| h. | Telephone outlets, wall mounted  | 46 in. |
| i. | Distribution panelboards, to top of backbox  | 72 in. |
| j. | Terminal cabinets, control cabinets, to top of backbox   | 72 in. |
| k. | Disconnect switches, motor starters, enclosed circuit breakers.  | 48 in. |
2. Where structural or other interferences prevent compliance with mounting heights listed above, consult Owner's Representative for approval to change location before installation.
- I. Hangers and Supports:
1. Provide steel angles, channels and other materials necessary for the proper support and erection of motor starters, distribution panelboards, large disconnect switches, large circuit breakers, pendant mounted lighting fixtures, etc.
  2. Panelboards, disconnect switches, circuit breakers, cabinets, large pull boxes, adjustable speed drives, cable support boxes and starters shall be secured to the building structure and not supported from conduits. Small panelboards, etc., as approved by Owner's Representative, may be supported on walls. Racks for support of conduits and heavy electrical equipment shall be secured to building construction by substantial structural supports.
- J. Identification:
1. Provide engraved lamicaid identification nameplates on switchboards, main service disconnects, transfer switches, motor control centers and on all panelboards using designation shown in panelboard schedule. Include voltage, phase, equipment served, voltage source to panel or equipment.
  2. Provide engraved lamicaid identification nameplates for each circuit breaker in the main distribution panel listing the panelboard or equipment connected to each device.
  3. Provide engraved lamicaid identification nameplates on all items of equipment including individual circuit breaker enclosures and disconnect switches, listing the equipment connected to the particular device provided under Specification Section 262000, including, but not limited to: starters, disconnect switches, adjustable speed drives, circuit breakers, etc. Include voltage, phase, equipment served, voltage source to panel or equipment.

4. Provide complete type written directory for each panelboard listing room number, function, etc., for each circuit breaker. Provide type written updated panelboard directories for existing panelboards affected by this work.
5. Nameplates shall be engraved black, with white core, with Helvetica medium 3/16 in. lettering. 1/8 in. lettering is acceptable where space of 3/16 in. is not available.
6. Identify junction and pullboxes for particular service and circuit such as power, lighting, fire alarm, telephone, interphone, public address, nurse call, etc. using stencil lettering on cover.
7. Provide signage at each electrical service room indicating "DANGER - HIGH VOLTAGE - KEEP OUT". Utilize adhesive backed, yellow background, block lettering signage at door.
8. Using adhesive backed printed tape label all receptacle and switch coverplates, power poles, etc. listing panel designation and circuit number. Tape shall be attached to inside of receptacle or switch coverplates.

K. Spare Parts:

1. Deliver to Owner and obtain receipt for spare parts including key switches, fuses, etc.

### 3.2 TESTS

- A. Branch circuits shall be tested during installation for continuity and identification and shall pass operational tests to determine that all circuits perform the function for which they are designed. For all feeder wiring rated 600 volts or less, provide 1,000 volt "Megger" insulation test prior to energizing feeders. Use a 1,000-volt motor driven megger for all tests. Test voltage shall be applied until readings reach a constant value, and until three (3) equal readings, each one (1) minute apart, are obtained. Minimum megger reading shall be 45 megohms for feeder conductors. Document test results and submit for approval prior to energizing conductors.
- B. For all feeder wiring rated above 600 volts, provide high potential test as follows:
  1. Disconnect cable to be tested from switchgear, transformers, etc., at each end so that voltage is applied only to the cable being tested.
  2. Test cable with 500-volt megger, to insure cable is clear of any grounds and perform a Polarization Index (PI) time resistance test as follows:
    - a. Connect 5000 volt megger to cable and ground.
    - b. Subject cable to 5000 volts for 10 minutes.
    - c. Take readings at one (1) minute and ten (10) minutes and take the ratio of the 10 minute reading to the 1 minute reading and compare the results to the following table. If the cable insulation compares to the Okay of Good categories, continue to the Hypot test. If the results are less than favorable, investigate and correct before continuing.



INSULATION CONDITION	PI RESULT
POOR	<1
QUESTIONABLE	1 - 2
OK	2 - 4
GOOD	>4

END OF SECTION

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## SECTION 26 05 26 GROUNDING

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. Provide grounding system equal to or exceeding the requirements of NEC and as indicated in the contract documents. Raceway system which includes metal conduit, wireways, pullboxes, junction boxes, busway, wire ways, cable trays, enclosures, motor frames, etc., shall be made to form a continuous, conducting permanent ground circuit of the lowest practical impedance to enhance the safe conduction of ground fault currents and to prevent objectionable differences in voltage between metal nonload current carrying parts of the electrical system.
- B. Provide solid grounding of building structures and electrical and communications systems and equipment. It includes basic requirements for grounding for protection of life, equipment, circuits and systems. Types of grounding systems include the following:
  - 1. Building Grounding
  - 2. Equipment Room Ground Terminal Bar
  - 3. Electrical Equipment Grounding

#### 1.2 QUALITY ASSURANCE

- A. All methods of construction, details of workmanship, that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc., correspond to the nomenclature dictated by those manufacturers. Where "or equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.
- B. Electrical Components, Devices and Accessories: Listed and labeled as defined in the NEC by Nationally Recognized Testing Laboratory (NRTL) and marked for intended use.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

#### 1.3 REQUIREMENTS

- A. Grounding conductors, bonding conductors, jumpers, grounded conductors, etc. shall be sized in accordance with the NEC.
- B. Equipment and materials shall be installed in accordance with the manufacturer's recommendations.

**1.4 SUBMITTALS**

A. Provide submittals for the following:

1. Ground rods and connectors.
2. Ground bars.

**PART 2 - PRODUCTS**

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**2.1 MATERIALS**

A. Conductors:

1. Exposed grounding components such as bars, straps, cables, flexible jumpers, braids, shunts, etc., shall be bare copper unless otherwise indicated.
2. Grounding conductors in raceway with 600V circuiting shall be insulated to match the circuit conductors with green color.
3. Grounding conductors used with system voltage greater than 1000V shall be bare unless otherwise indicated.
4. Grounding conductor size shall be as indicated or as required by the NEC whichever is larger, stranded, soft drawn or soft annealed copper, unless otherwise indicated. Sizing shall take into account circuit voltage drop.
5. Acceptable Manufacturers:
  - a. Same make as for 600 volt conductors.

B. Connectors, Clamps and Terminals:

1. Mechanical connectors and clamps shall be made of copper alloy or silicon bronze. Solderless compression terminals shall be copper, long-barrel, NEMA two bolt. Bolts and washers (Belleville) shall be of comparable material or stainless steel.
  - a. Acceptable Manufacturers:
    - 1) Burndy
    - 2) Hubbell Anderson Corp.
    - 3) Thomas & Betts
    - 4) Approved equal
2. Exothermic Welds:
  - a. Provide exothermic welds designed for size and type of intended cable, rods, structure, etc. Solder prohibited for connections, except for medium and high voltage cable metallic tape shields (utilize mechanical and solder).
  - b. Acceptable Manufacturers:
    - 1) Erico "Cadweld"
    - 2) Burndy "ThermOweld"

- 3) Approved equal
- 3. Pipe Clamp:
  - a. Pipe clamp for bonding to pipe type electrode (water pipe, etc.) shall be a suitably sized copper alloy clamp.
  - b. Acceptable Manufacturers:
    - 1) Burndy GAR-BU
    - 2) O-Z Gedney type CG
    - 3) Burndy "Durium"
    - 4) AFL Global "Everdur"
    - 5) Approved equal
- 4. Flexible Strap:
  - a. Flexible grounding straps shall be of braided high conductivity copper with two hole connector. Strap shall have equal to or greater than ampacity of the system it is bonding to. Strap shall provide flexibility in all directions when installed properly.
  - b. Acceptable Manufacturers
    - 1) Burndy
    - 2) OZ Gedney
    - 3) Approved Equal

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Grounding Conductors:
  - 1. Provide grounding conductor(s) with all power circuits. Conductor shall be sized as indicated or as required by the NEC as a minimum and shall be terminated on the equipment, device, enclosure, etc. grounding terminal. Conductor size shall be for the entire length unless approved by the Engineer where oversized for voltage drop.
  - 2. Conductors above grade to ground electrodes (water piping, structural column, etc.) and to equipment (service entrance, ground bars, ground halos, etc.) shall be installed in metallic conduit with ends bonded to the conduit.
  - 3. Grounding conductors shall be installed to have a minimum radius of 3 in.
  - 4. Grounding conductors in a raceway system shall be terminated/bonded to each box, cabinet, enclosure, etc. through which it passes or terminates.
  - 5. Grounding conductors routed with underground circuits shall be bonded to each ground electrode and metallic cable support system within the raceway system including pull and access locations.
  - 6. Stranded conductors penetrating vapor barriers, foundations, slab on grade and water stop membranes shall have the interstitial spaces between strands filled with solder 4 in. beyond the membrane each side. The conductor shall be sealed to the membrane with a manufacturer approved method.

**B. Raceway Systems:**

1. All metal supports, cable trays, messenger cables, frames, sleeves, brackets, braces, etc. for the raceway system, panels, switches, boxes, starters controls, etc., which are not rigidly secured to and in contact with the raceway system, or which are subject to vibration and loosening, shall be bonded to the raceway system.
2. Termination of rigid conduit at all boxes, cabinets, and enclosures shall be made up tightly with a double locknut arrangement and a bushing, bushings being of the insulated type. Utilize grounding bushings as specified elsewhere in these specifications.
3. Conduit which runs to or from boxes, cabinets, or enclosures having concentric or eccentric knockouts which partially perforate the metal around the conduit and hence impair the continuity of system ground circuits shall be provided with bonding jumpers connected between a grounding type bushing/locknut on the conduit and a ground bus or stud inside the box, cabinet, or enclosure and attached thereto.
4. Conduit expansion joints and telescoping sections of metal raceways shall be provided with bonding jumpers sized in accordance with the NEC.

**C. Connectors Clamps and Terminals:**

1. Connectors utilized above grade in dry accessible locations shall be mechanical or exothermic type.
2. Connectors in damp locations, below grade or if not indicated shall be exothermic type.
3. Clean the area near the connecting surfaces prior to any connection to ensure effective contact. Cleaning shall be to the bare metal. Wire brush area if needed to remove rust scale paint, dirt, etc. to expose bare metal.

**D. Flexible Strap:**

1. Flexible straps shall be used when bonding vibrating/moveable equipment, with expansion fittings and where recommended by the manufacturer.
2. Sufficient slack shall be provided to compensate for the anticipated vibration, movement and expansion.

**E. Primary Electrical Equipment/Systems:**

1. Transformers:
  - a. Primary voltages including those above 600 volts.
  - b. Provide a minimum of two #4/0 bare ground conductors from the transformer pad electrodes or building main ground bar to the transformer enclosure ground stud/pad/terminals.
  - c. Provide a #4/0 bare ground conductor from each lightning arrester to the transformer enclosure ground stud/pad/terminals.
  - d. For exterior pad mounted transformers, provide a bonding conductor sized in accordance with the NEC from the transformer neutral terminal to the ground stud/pad/terminals.

- e. Connect system primary and secondary circuit grounding conductors to the transformer enclosure ground stud/pad/terminals.
2. Cabling:
- a. All medium and high voltage cable shielding shall be bonded to the local ground system in all buildings, switchgear, transformers, manholes containing splicing/connectors, etc. Suitable terminations, connectors, splices, etc. should be used to expose the cable shield for grounding.
  - b. The grounding conductors contained in the interstices of interlocked armor cable shall be connected to the ground bus at every equipment termination point and to each other and to system ground; ground at every splice location.
  - c. The grounding conductor contained in raceway systems shall be connected to the ground bus at every equipment termination point and to each other and to system ground; ground at every splice location.

F. Secondary Electrical Systems:

- 1. The neutral (grounded) conductor of each low voltage, single and/or polyphase system or distribution system, except special isolated double insulated systems, shall be solidly connected to ground at the transformer neutral bushing, or at the main secondary switchgear to the system ground, and shall be sized for current carrying capacity, not to be less than as required by the NEC. Ground connection shall be to the building grounding system, building steel, building water service, building concrete reinforcement and as indicated.
- 2. Provide equipment grounding conductor, green colored insulation, with phase conductors, to primary side of all transformers rated 600 volts or less circuited to the enclosure and secondary neutral bushing, to all electrical utilization and distribution equipment; insulation shall be same type as phase conductors. Transformer enclosures shall be bonded to the primary and secondary circuit grounding conductor.
- 3. Equipment grounding conductors shall extend from the point of termination back to the ground bus of the source panelboard, switchboard, transformer, or switchgear.

G. Equipment Grounding:

- 1. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch circuit conductors.
- 2. Surge Protection Device (SPD) Ground Conductor Installations: Extend SPD dissipation ground conductors to local equipment ground bus and to common grounding electrode conductors. Size conductors per SPD manufacturer recommendations and the NEC.

**H. Grounding and Bonding for Piping:**

1. **Metal Water Service Pipe:** Install insulated copper grounding conductors in conduit from building's main service equipment or grounding bus to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes using a bolted clamp connector or by bolting a lug-type connector to a pipe flange using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor or sleeve to conductor at each end.
2. **Water Meter Piping:** Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

**3.2 GROUND TERMINAL BUS INSTALLATION**

- A. Install ground terminal bar in rooms where shown on the drawings. Mount bar 18 in. above finished floor by anchors and bolts using 1-1/2 in. long insulated spacer between bar and wall. Use a minimum of two (2) supports 18 in. on center. Connect all grounding electrode system conductors, system enclosure ground bus, and other indicated electrode systems to the terminal bar.
- B. Label grounding conductors terminated to bus for equipment, location, electrode, etc served.

**3.3 TESTS**

- A. Test the building ground system before backfilling to ensure continuity and determine system resistance value.
- B. Testing procedure shall be a fall of potential type with a moving auxiliary electrode in accordance with IEEE Standard 142 and reviewed/approved by the Engineer. Sufficient test points shall be taken for accurate resistance value.
- C. Make resistance measurements in dry weather, no earlier than 48 hours after rainfall. Provide tabulated test results indicating distance between rods and resistance readings on a plotted graph.
- D. Test each ground electrode system separately prior to connection to the system or main building ground bar. Test each system ground electrode system a second time after backfilling has occurred and all final connections (building steel, water service, etc.) have been made.
- E. Soil type, date, time, meter manufacturer/model number, person performing the test, test witnesses and most recent rainfall shall be noted in test submittal.

**END OF SECTION**



**SECTION 26 20 00**  
**ELECTRIC DISTRIBUTION**

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**PART 1 - GENERAL**

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**1.1 DESCRIPTION**

- A. Provide a complete distribution system, as indicated on the Contract Documents and as specified herein.

**1.2 QUALITY ASSURANCE**

- A. All methods of construction, details of workmanship, that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc., correspond to the nomenclature dictated by those manufacturers. Where "or equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.
- B. Installation shall be in accordance with NFPA-70 (National Electrical Code), National Electrical Safety Code (NESC), state codes, local codes, and requirements of authority having jurisdiction.
- C. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMA, UL and IEEE Standards.

**1.3 SUBMITTALS**

- A. Submit the following product data/information:
1. Manufacturer and equipment type.
  2. Standard catalog information sheet.
  3. Detailed shop drawings indicating plan, elevation, end and isometric views. Top and bottom conduit areas shall be clearly shown and dimensioned on the drawings.
  4. Single-line diagram.
  5. Complete Bill of Materials.
  6. All relevant ratings including, but not limited to, voltage, current, interrupting and withstand.
  7. Over-Current Device Information.
  8. Submit available and final settings, programming and adjustments.
- B. Submit product data and information for the following equipment, materials, products, etc.:

1. Dry type transformer(s) including shielded and linear load transformer(s).
2. Distribution and branch circuit panelboards.
3. Enclosed circuit breakers.
4. Motor starters, contactors and relays.
5. Disconnect switches.

#### 1.4 WARRANTY

- A. Provide full system warranty (labor, travel, equipment, etc.) in accordance with Division 1 and a minimum of one (1) year from acceptance.

### PART 2 - PRODUCTS

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#### 2.1 MATERIALS

- A. Dry-Type Transformers:
  1. Transformers to be self-cooled ventilated dry type. Transformers that require internal or external fan assisted forced air cooling to obtain ambient air (AA) rated kVA are not acceptable. Transformers 15 kVA and less shall have 185°C insulation system and shall be designed not-to-exceed 115°C rise above 40°C ambient. Transformers 30 kVA and higher shall have 220°C insulation system and shall be designed not-to-exceed 150°C rise above 40°C ambient. Insulation systems shall be U.L. listed. Cores shall be manufactured from a high-grade, non-aging, silicon steel with high magnetic permeability, low hysteresis and eddy current losses, and shall be clamped with structural angles and bolted to the enclosure to prevent damage during shipment or rough handling. Remove clamping after installation. Coils shall be copper, vacuum impregnated with non-hydroscopic thermosetting varnish and shall have a final wrap of electrical insulating material designed to prevent injury to the magnet wire. Transformers having coils with magnet wire visible will not be acceptable. 30 KVA, and larger, floor mounted. Under 30 KVA, wall mounted. Provide Mason type ND, Korfund or Vibrex vibration isolation devices for each transformer.
  2. Ratings: Shall be as indicated on the "Transformer Schedule" or as noted on the drawings. IEEE #C57, NEMA and US Government requirements shall apply. The transformer efficiencies shall meet or exceed the requirements of New York State and the US Department of Energy.
  3. For transformers up to 300 kVA, provide with 6-2-1/2% full capacity taps, 2-FCAN (for connections above nameplate) and 4-FCBN (for connections below nameplate). For transformers above 300 kVA, provide 4-2-1/2% fully rated taps, 2-FCAN and 2-FCBN.
  4. Manufacturers: Subject to compliance with contract documents, the following manufacturers are acceptable:
    - a. Square D
    - b. Eaton Corporation
    - c. General Electric
    - d. Acme
    - e. Heavy-Duty

## f. Howard

## B. Distribution Panelboards (Nominal 600 Volt):

1. Provide distribution panelboards as indicated in the "Panelboard Schedule" and as located on the drawings. Panelboards shall be equipped with quick make/quick break thermal magnetic, molded case circuit breakers as scheduled.
2. Panelboard bussing and lugs shall be copper. Provide grounding bus in each panelboard, *securely bonded to the box*. Panelboard bus structure, main lugs, and main breaker shall have current ratings as indicated. Such ratings shall be established by heat rise tests with maximum hot spot temperature on any connector or bus bar not to exceed 50°C rise above ambient.
3. Circuit breakers shall be equipped with individually insulated, braced and protected connectors. Large permanent, individual circuit numbers shall be affixed to each breaker in a uniform position. Tripped indication shall be clearly shown by the breaker handle taking a position between "ON" and "OFF". Provisions for additional breakers shall be such that no additional connectors will be required to add breakers.
4. Each panelboard, as a complete unit shall have a short circuit rating equal to *or greater than the rating shown on the Panelboard Schedule*. All panelboards shall be fully rated. "Series Ratings" are NOT acceptable. The use of series rating of panelboards for short circuit rating is not acceptable.
5. Panelboard assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets. The size of wiring gutters shall be in accordance with UL Standard 67. Cabinets shall be equipped with locks and all locks shall be keyed alike. End walls shall be removable. Fronts shall be of code gauge, full-finished steel with rust-inhibiting primer and baked enamel finish.
6. The panelboard interior assembly shall be dead front with panelboard front removed. Panelboard front shall be door in door construction with full length piano-hinge. Main lugs or main breakers shall be barriered on five (5) sides. The end of the bus structure opposite the mains shall be barriered.
7. Panelboards shall be UL listed for use intended.
8. Ratings shall be as indicated in the contract documents.
9. Manufacturers: Subject to compliance with contract documents, the following manufacturers are acceptable:
  - a. Square D "I-Line"
  - b. Eaton Corporation "PRL3"
  - c. General Electric "CCB"
  - d. Siemens

## C. Branch Circuit Panelboards (480Y/277 volt, 208Y/120 volt, 240/120 volts):

1. Provide branch circuit panelboard as indicated in the "Panelboard Schedule" and as located on the drawings. Panelboards shall be equipped with quick make/quick break thermal-magnetic, molded case circuit breakers as scheduled.

2. Panelboard bussing and lugs shall be copper. Provide grounding bus in each panelboard, securely bonded to the box. Panelboard bus structure and main lugs or main circuit breaker shall have current ratings as indicated. Such ratings shall be established by heat rise tests, conducted in accordance with UL Standard 67.
3. Provisions for additional circuit breakers shall be such that field addition of connectors or mounting hardware will not be required to add circuit breakers to the panelboard. Bus connections shall be bolt-on **plug-on**.
4. Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the rating shown on the Panelboard Schedule or on the plans. All panelboards shall be fully rated. "Series Ratings" are NOT acceptable. Reducing breaker ratings on the basis of series rating is not acceptable.
5. The panelboard bus assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be specified in UL Standard 50 cabinets. Wiring gutter space shall be in accordance with UL Standard 67 for panelboards. Each front shall include a door and have a flush, stainless steel, cylinder type lock with catch and spring-loaded door pull. All panelboard locks shall be keyed alike. Doors shall be mounted by completely concealed steel hinges. A circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door. Fronts shall be of code gauge, full-finished steel with rust inhibiting iron phosphate sealer and baked enamel finish. Minimum box width shall be 20 in. Provide door-in-door construction Panelboard to be keyed to match the Owner's existing system.
6. Ratings shall be as indicted on the Panelboard Schedule.
7. Manufacturers: Subject to compliance with Contract Documents, the following manufacturers are acceptable:
  - a. 480Y/277 Volt:
    - 1) Square D "NF"
    - 2) Eaton Corporation "PRL2"
    - 3) General Electric "AE"
    - 4) Siemens
  - b. 208Y/120 Volt and 240/120 Volt:
    - 1) Square D "NQ"
    - 2) Eaton Corporation "PRL1"
    - 3) General Electric "AQ"
    - 4) Siemens

D. Circuit Breakers:

1. Circuit breakers below 400 amp frame shall be molded case with inverse time and instantaneous tripping functions, unless indicated otherwise in contract documents.
2. Listed combination of coordinated circuit breakers shall be verified by the equipment manufacturer utilizing published data sheets. Confirm listings shall be submitted.

3. Lugs shall be mechanical, rated for 60/75° AL/Cu.
4. Branch circuit breakers shall be quick-make, quick-break, thermal-magnetic and trip indicating, and multipole breakers shall have common trip. Single pole 15 and 20 ampere circuit breakers shall be UL listed as "Switching Breakers" at 120V ac or 277 V ac and carry the SWD marking.
5. Ratings shall be as indicated in the Contract Documents.
6. Enclosed circuit breakers shall be molded case, thermal-magnetic type, ratings as noted, with overcenter, trip-free, toggle-type operating mechanism, quick make/quick break action and positive handle indication. Multiple pole breakers shall be common trip type. Each circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole. Provide provisions for padlocking in the "off" position. Breakers shall be calibrated for operation in an ambient temperature of 40°C and shall be suitable for mounting and operating in any position. Breakers shall have removable lugs, UL listed for copper and aluminum conductors. Breakers shall be installed in NEMA 1 general purpose, surface enclosures, unless otherwise noted.
  - a. Manufacturers: Subject to compliance with Contract Documents, the following manufacturers are acceptable:
    - 1) Square D
    - 2) Cutler Hammer
    - 3) General Electric
    - 4) Siemens

E. Motor Starters:

1. Provide motor starters, disconnect switches, etc. as listed on the Electric Equipment and Control Schedule on the drawings.
2. Starters, contactors and controllers shall comply with NEMA standards having general purpose NEMA 1 or 1B enclosure unless otherwise called for. Provide explosion proof, weather resistant or watertight construction as required. Starters shall be minimum NEMA size 0 with overloads in each phase sized per NEC, motor full load amperage, service factor, and motor operating conditions.
3. Pad lock arrangements shall be provided to lock the disconnect device in the "off" position. Magnetic starters shall be provided with a control power transformer with 120V secondary and primary and secondary fusing and be sized to accept the loads imposed there on. Starters shall have LED type pilot lights. Each starter subject to electrical interlock and/or automatic control shall have necessary auxiliary contacts.
4. Auxiliary Devices: Provide pushbutton stations, pilot lights, devices, relays, transformers, selector switches, electric thermostats, auxiliary starter contacts as required for functions called for. Provide separate relay for each speed to operate electric dampers or other devices as required for multispeed motor circuit.

5. Manual Motor Starter:
  - a. Provide all starters with thermal overload(s); and pilot light(s), and handle lock-out provisions. Gang starter with selector switch for multispeed applications. Provide single or 2-pole as required:
    - 1) 120 volt, single-pole, surface mounted: Square-D FG-5P and handle guard.
    - 2) 240 volt, two-pole, surface mounted: Square-D FG-6P and handle guard.
    - 3) 120 volt, single-pole, two speed, surface mounted: Square-D FG-11P and handle guards.
    - 4) 240 volt, two-pole, two-speed, surface mounted: Square-D FG-22P and handle guards.
    - 5) 120 volt, single-pole, H-O-A selector, surface mounted: Square-D FG-71P and handle guard.
    - 6) 240 volt, two-pole, H-O-A selector, surface mounted: Square-D FG-72P and handle guard.
6. Manual Motor Starter - Speed Controller: Shall be similar to "Manual Motor Starter", above, except two-gang with motor speed control sized to handle motor indicated, with positive full on and full off bypass of speed control unit.
7. Manual Starter with Relay: Shall be similar to "Manual Motor Starter", above, except to include a two-gang box with relay sized for load indicated, and hand-off-automatic switch. Connect relay for 120V operation on load side of starter in "automatic" mode. Coordinate connection of Form C maintained contact for control with Mechanical Contractor.
8. Magnetic Starter: Shall be single-speed, across-the-line type rated in accordance with NEMA standards, sizes and horsepower ratings. Starters shall be mounted in NEMA 1 enclosures unless otherwise indicated. Magnetic starters shall be equipped with fused control power transformer for 120V control power and double break silver alloy contacts; all contacts shall be replaceable without removing starter or disconnecting power wiring. Starter shall have straight-through wiring. Coils shall be of molded construction and shall be replaceable from the front without removing starter. Overload relays shall be solid state type with replaceable control circuit module. Thermal units shall be of one-piece construction and interchangeable. Starter shall be inoperative if thermal unit is removed. Provide hand-off-auto selector switch and start-up pushbuttons and "run" pilot light in cover. Wire for maintained contact unless otherwise noted.
9. Combination Magnetic Starter: Shall be similar to "Magnetic Starter", above, except shall include fusible disconnect switch thermal magnetic circuit breaker connected ahead of starter. The disconnect handle shall be in control of the disconnect device with the door open or closed. Disconnect handle shall be clearly marked as to whether the disconnect device is "on" or "off".
10. Combination Two-Speed Magnetic Starter: Shall be similar to "Combination Magnetic Starter", above, except with two starters, and six thermal overload units coordinated to match torque and horsepower characteristics of the

motor. Starter shall be designed for variable torque operation, and shall be provided with high-low-off-auto selector switch and high and low pilot lights mounted in the cover. Wire for maintained contact unless otherwise noted.

11. Combination Reduced Voltage Magnetic Starter: Shall be similar to "Combination Magnetic Starter", above, except autotransformer closed transition reduced voltage type with autotransformer protection by winding over-temperature device.
12. Packaged Control Unit: Shall be furnished and mounted by others, and installed and connected by Electrical Contractor. Generally consists of one or more starters, disconnect switches and additional control devices prewired.
13. Contactor: Shall be similar to "Magnetic Starter", above, except without thermal overload units.
14. Manufacturers: Subject to compliance with contract documents, the following manufacturers are acceptable:
  - a. Square-D
  - b. Cutler Hammer
  - c. General Electric
  - d. Allen-Bradley
  - e. Siemens
15. **Manufacturers: Subject to compliance with contract documents, the following manufacturers are acceptable:**
  - a. **Manual, 1 HP and under - Allen Bradley Bulletin 600.**
  - b. **Manual, 1-1/2 to 5 HP, 1 phase - AB Bulletin 609.**
    - 1) **1.H.15.b.1.a.1. Manual, 1-1/2 to 7 1/2, 3-phase - AB Bulletin 609.**
  - c. **Magnetic, AB Bulletin 509, minimum, NEMA size 1.**
  - d. **Combination, AB Bulletin 512, minimum, NEMA size 1.**

F. Disconnect Switches:

1. Shall be heavy-duty type three-pole, with "Quick Make/Quick Break" operating handle mechanically interlocked with the cover, horsepower and voltage rated to match equipment served. Where indicated switches shall be provided with dual-element, time delay, rejection type fuses. Switches shall be installed in NEMA 1, for indoor use, NEMA 4X for outdoor use. Provide provisions for padlocking in the "off" position. Provide neutral bar in single phase or three phase, four wire circuits, and ground bar in all switches. Provide auxiliary contacts where called for.
2. All disconnects connected downstream of ASD's shall have a normally open and normally closed auxiliary contacts which shall be wired to the ASD to indicate disconnect is open.
3. Manufacturers: Subject to compliance with Contract Documents, the following manufacturers are acceptable:

- a. Square-D
  - b. Cutler Hammer
  - c. General Electric
  - d. Siemens
- G. Fuses:
1. All fuses rated 600 volts and below shall be rejection type dual-element, time-delay type. Provide two (2) complete sets of fuses for all fusible devices. Deliver spare fuses to the Owner and obtain receipt.
  2. Manufacturers: Subject to compliance with Contract Documents, the following manufacturers are acceptable:
    - a. Fuses 600 Amperes and Below: Bussman Type FRS-R (600 volts), Bussman Type FRN-R (300 volts) or equivalent.
    - b. Fuses Rated Above 600 Amperes: Bussman Type KRP-C or equivalent.

## **PART 3 - EXECUTION**

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### **3.1 INSTALLATION**

- A. All equipment shall be grounded per the NEC.
- B. Electrical distribution equipment shall have lugs/terminations suitable for the indicated conductor size. Where conductors have been oversized for voltage drop and where approved by the Engineer it shall be allowed to reduce the conductor size using hydraulically crimped splice in a box next to the distribution equipment to allow for standard lug termination.
- C. Install dry-type transformers with adequate clearances for proper ventilation. Bolt floor mounted transformer to pad.
- D. Distribution switchboards, motor control centers and floor mounted dry-type transformers shall be mounted on 4 in. high concrete pads which shall extend 3 in. on all sides. Securely bolt the unit to the pads for proper horizontal and vertical alignment.
- E. Coordinate transformer pad dimensions with transformer manufacturer's requirements. Coordinate transformer pad locations, dimensions and details with General Contractor.
- F. Motor Starters:
1. Coordinate overload and fuse sizes with the Contractor providing the equipment to be controlled.
  2. Coordinate termination of control wiring with the Contractor providing the equipment to be controlled.



G. Identification:

1. Identify all items of equipment as described in Section 260501-3.1, Identification.

**3.2 ELECTRICAL LOAD TEST**

A. Conduct a load test prior to request for final payment and comply with the following:

1. Energize maximum normal light and power load for a period of two hours when scheduled.
2. Record voltage at service and at each panel.
3. Measure current in each phase of all feeders.
4. Adjust transformer taps as directed by engineer after review of report.
5. Provide and install all necessary metering equipment.
6. Owner's Representative or Site Representative shall witness the test.
7. Before final acceptance specified test shall be completed to the satisfaction of the Owner's Representative who shall be sole judge of the acceptability of such tests and who may direct the performance of such additional tests as deemed necessary in order to determine the acceptability of the systems, equipment, material and workmanship. Additional tests required by the Owner's Representative shall be provided at no additional cost. Protective equipment shall be actuated in a manner that clearly demonstrated their workability and operation.

**3.3 CLEANING**

- A. At the completion of the project, while equipment is de-energized, it shall be thoroughly cleaned to a shipped condition using methods in accordance with the manufacturer's recommendations. Utilize vacuum for cleaning and not compressed gas.

**3.4 SPARE PARTS**

- A. Deliver loose equipment to the Owner and obtain receipt for fuses, keys to panelboards, etc.

**3.5 DISCONNECT DEVICES**

- A. All disconnect devices downstream of ASD's: Provide wiring, conduit and connections between ASD and disconnect auxiliary switch to ASD.

**END OF SECTION**

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**SECTION 26 50 00**  
**LIGHTING**

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**PART 1 - GENERAL**

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**1.1 DESCRIPTION**

- A. Provide interior and exterior lighting systems, including luminaires, hangers, supports, fittings, lamps, wiring, connections and controls, as indicated in the Contract Documents for complete and operational systems. Luminaires, in general, have been specified for the particular type of ceiling in which they are to be installed. Verify the ceiling construction details and provide luminaires suitable for the respective ceiling types and room finish schedule.

**1.2 ENERGY CONSERVATION WORK**

- A. Work installed as part of this Contract will be eligible for energy rebates/incentives available. The energy rebate shall be paid directly to the Owner. The Electrical Contractor shall cooperate with the Owner and the funding source to provide proof of purchase information, quantities involved, fill out forms, etc., to accommodate all required paperwork. Include all costs associated with this requirement.

**1.3 QUALITY ASSURANCE**

- A. All luminaires shall be new and bear a NRTL label for the service intended. Luminaires shall be standard products of manufacturers regularly engaged in the manufacture to the specific type light luminaires specified and shall be the manufacturer's latest standard design that complies with specification requirements. Manufacturer's luminaire catalog numbers as indicated on the "Luminaire Schedule" indicate quality, type, and style, but may not cover required special design details. Provide luminaires having such special details as noted in the "Luminaire Schedule", as indicated by the specified luminaire model number and as required for proper installation. Verify the availability of all luminaires proposed to be used in the execution of the work prior to submitting same for approval. The discontinuance of production of any luminaire after such approval has been granted shall not relieve the Contractor from furnishing an approved luminaire of comparable quality and design at no additional cost. Luminaires shall be as specified in the "Luminaire Schedule". Luminaire types, appearance, characteristics, photometrics, finishes, etc., correspond to the specified manufacturer, and associated catalog number, listed in the "Luminaire Schedule". Products of other listed acceptable manufacturers shall be equivalent in every way to that of the luminaire specified. The Engineer reserves the right to disapprove any luminaire type submitted which he feels is not equal in quality, appearance or performance to the luminaire specified.
- B. Should there be any difference between drawings and schedules, secure from Architect/Engineer such information as is necessary before tendering his proposal. When finishes are not definitely specified, they shall be as selected by the Architect.

- C. Locations indicated for luminaires are approximate. Field coordinate exact locations as near as possible to the location indicated. Coordinate with the Engineer for any major location changes.

#### 1.4 SUBMITTALS

- A. Submit shop drawings as described in Section 260500. Luminaire shop drawings shall include photometric data for each luminaire utilizing the specified lens/louver type, lamp(s) and ballast(s). All luminaire types for the project shall be submitted in a single complete package which shall be in the form of a soft cover binder with each luminaire separated by an identified index tab. Information on each luminaire shall include:
  1. Manufacturer and Catalog Number.
  2. Dimensioned Construction Drawing(s).
  3. Complete Catalog "Cut" Sheet.
  4. Photometrics (space to mounting height ratio, coefficient of utilization complete values, IES distribution hard and electronic copy, candlepower distribution by angle and luminaire efficiency).
  5. Lens/Louver Type.
  6. Reflector information (type, material, reflectance, etc).
  7. Ballast with each type luminaire as applicable (type, sound rating, overload protection, voltage, input/fixture wattage, ballast factor, power factor, etc.).
  8. Materials for all components.
  9. Socket Type.
  10. Lamp (rated life, initial lumen output, mean lumen output, Kelvin color, color rendering index, dimensions, wattage, socket type, mercury content).
  11. Certification of IES LM-79 an IES LM-80 testing for LED luminaires.
  12. Proof that the lamps and ballasts to be provided are on the Consortium for Energy Efficiency's (CEE) list of approved equipment.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Luminaires and equipment shall be delivered with NRTL and manufacturer's labels intact and legible. Broken, cracked and damaged materials and equipment shall be removed from the site immediately and be replaced with new materials and equipment. Luminaires and accessories shall be stored in protected dry locations in their original unbroken package or container. Luminaires shall be protected from dust and dampness both before and after installation. Luminaires shall be protected from paint and cleaning solvents during all phases of construction.

### PART 2 - PRODUCTS

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#### 2.1 LUMINAIRES

- A. Luminaires shall be identical in construction features, options, performance and appearance to the luminaires specified in the Luminaire Schedule. Luminaires and all components shall be suitable and rated for the intended use and location.

## 1. Lamps:

- a. Lamps shall be suitable for the intended luminaire and meet the luminaire requirements and ratings.
- b. Fluorescent:
  - 1) General: lamps shall have 3500 degree Kelvin color and minimum starting temperature of 0°F.
  - 2) Linear lamps shall at a minimum have a CRI of 79, 65 lumens per watt and 30,000 hour rated life at 3 hours per start.
  - 3) Compact fluorescent lamps shall be four pin, replaceable, minimum rated life of 10,000 hours, Energy Star rated and a minimum CRI of 82.
  - 4) T8 2' linear lamps shall be a minimum have a CRI of 82, 10,000 hour rated life at three (3) hours per start and 4,000 initial lumen/50 watt at 77°F. T8 4' U-lamps (2' lengths) shall at a minimum have a CRI of 85, 20,000 hour rated life at three (3) hours per start and 2,400 initial lumen output/25 watt at 77°F
  - 5) T8 4' lamps shall at a minimum have a CRI of 85, 36,000 hour rated life at 3 hours per start and 3100 initial lumen output/32 watt at 77°F.
  - 6) T5 4' lamps shall at a minimum have a CRI of 85, 20,000 hour rated life at 3 hour starts and 2700 initial lumen output/28 watt at 77°F.
  - 7) T5 HO 4' lamps shall at a minimum have a CRI of 85, 25,000 hour rated life at 3 hour starts and 4,400 initial lumen output/54 watt at 77°F.
  - 8) **Lamps which shall be installed in fixtures to meet specific energy performance requirements such as those from NYSERDA, shall be listed on the Consortium for Energy Efficiency (CEE) list of approved lamps and ballasts.**
  - 9) All low temperature fluorescent lamps shall be rated by the manufacturer to start in the climate in which they shall be installed.
- c. Metal halide lamps shall be phosphor coated or clear as called for by the luminaire design, and suitable for the burning position dictated by the luminaire. All metal halide lamps shall be of the safety type which automatically de-energize if the glass envelope is broken.
- d. High pressure sodium lamps shall be phosphor coated or clear as called for by the luminaire design, and suitable for the burning position dictated by the luminaire.
- e. Acceptable manufacturers:
  - 1) General Electric
  - 2) Osram/Sylvania
  - 3) Phillips

B. LED luminaires shall be identical in construction features, options and appearance to the luminaries specified in the Luminaire Schedule. LED luminaires include white and RGB systems respectively.

1. LED luminaries shall be provided with all cables, controllers, power supplies, connectors, terminators and accessories required for a complete installation. LED system shall utilize pulse width modulation, non-linear scaling techniques and reverse polarity protection for high-resolution output.
2. RGB LED systems shall be capable of at least 8-bit control of red, green and blue module. RGB LED system shall be capable of setting each module with a unique and individual address. Each address shall be controlled independently by DMX or alternate method protocol. All RGB LED fixtures shall undergo a minimum of eight-hour burn-in testing during manufacturing.
3. LED luminaries shall be high brightness and binned for forward voltage, luminous flux and wavelength.
4. LED luminaires shall be tested in accordance with IESNA LM-79 (luminous output, power input, luminaire efficacy (lumens/watt), color temperature and color rendering index) and IESNA LM-80 (output luminous maintenance, 10,000 hour minimum test). Luminaire output shall be a minimum of 60 lumens/watt. Rated life shall be a minimum of 50,000 hours at 50% output. Testing shall be performed by a US Department of Energy (DOE) accredited laboratory.
5. LED drivers shall be solid state Class 1 power supply/driver. The system shall have a minimum 90% power factor and a maximum of 30% THD, and heat sensing with color sensing feed-back. Adequate heat sink capability shall be provided to ensure the rated life.
6. The luminaire (to include LED lamps and LED drivers) shall have a full five (5) year minimum warranty for replacement and labor.

a. Acceptable LED Node Manufacturers:

- 1) Philips
- 2) Osram
- 3) Cree
- 4) Nichea
- 5) Lumiled

C. Ballasts:

1. Ballasts shall be designed for continuous operation within the luminaire provided, and utilizing the lamp(s) specified, without overheating or causing any other detrimental affects. Ballasts shall be quiet in operation and of the lowest noise level available. Luminaires shall in no way amplify ballast noise, but rather shall suppress ballast noise. Ballasts considered to have objectionable hum or noise shall be replaced immediately at no additional cost.

2. Fluorescent ballasts shall conform to UL and ANSI standards and shall display symbols of approval by the NRTL and of certification by the C.B.M. The component parts of the ballast shall be designed, fabricated, and assembled in accordance with the latest NEMA requirements. Ballasts shall be marked "Class P" indicating approved integral ballast protection. Fluorescent ballasts not "P" rated shall be individually fused at the ballast; fuses shall be cartridge type, sized as recommended by the manufacturer. Ballasts shall be high performance and have 0.95 power factor minimum, starting temperature of 0°F or less and a crest factor of 1.7 or less. Luminaires with two lamps or multiples of two shall have two-lamp ballasts. Three-lamp ballasts shall not be used. Ballasts for compact fluorescent lamps shall be electronic type.

a. Electronic Ballasts: Operating temperature shall not exceed 25°C temperature rise over 40°C ambient. Sound rating shall be "A+" with sound levels less than 18 dBA. Maximum input wattage at stabilized temperatures shall be 60 watts for two lamp ballast, or 30 watts for one lamp ballast, when using 32 watt T-8 lamps. Ballasts shall comply with Federal Communication Commission Rules and Regulation for EMI and RFI, applicable ANSI Standards on harmonic distortion, surge protection, etc., IEEE Publication 587, Category A for line transients. Lamps shall operate at a frequency of 20 to 35 kHz with no detectable flicker. Ballast shall be dual rated 120/277V. Maintain a constant light output at an input voltage of +/- 20% of rated voltage. Average lamp current crest factor not to exceed 1.4. Total harmonic distortion (THD) shall not exceed 10%. Ballast types shall be as listed below and as specified in the Luminaire Schedule.

1) Instant Start Ballasts:

- a) Ballasts shall operate without preheating of the lamp electrode and shall start lamps without delay upon activation of power.
- b) Ballasts shall provide high initial starting voltage to facilitate discharge between lamp electrodes.
- c) Ballasts shall be wired with lamps in parallel to allow additional lamps to remain lit if one lamp fails.
- d) Ballasts shall restart replacement lamps without needing the power to the ballasts to be cycled.
- e) Provide ballasts with ballast factor in the range of 0.8-1.15 as specified on Luminaire Schedule or 0.88 if not indicated.

2) Rapid Start Ballasts:

- a) Ballasts shall provide a low-voltage to lamp electrodes prior to starting in order to preheat the electrodes and allow a lower starting voltage than instant start ballasts.

- b) Ballasts shall be wired with lamps in parallel to allow additional lamps to remain lit if one lamp fails.
- c) Provide ballasts with ballast factor of 0.77 to 1.15 as specified on Luminaire Schedule or 0.89 if not indicated.

3) Programmed Start Ballasts:

- a) Ballasts shall provide optimal lamp electrode current to preheat electrodes, maximize lamp life in frequent switching applications and minimize required preheat time.
- b) Ballasts shall be wired with lamps in parallel to allow additional lamps to remain lit if one lamp fails.
- c) Ballasts shall restart replacement lamps without needing the power to the ballasts to be cycled.
- d) Provide ballasts with ballast factor of 0.6 to 1.15 as specified on Luminaire Schedule or 0.89 if not indicated.

4) Design Make Manufacturers:

- a) Advance
- b) General Electric
- c) Osram Sylvania
- d) Universal

b. **Unless otherwise noted, Thermal Magnetic Ballasts shall not be used for any linear fluorescent lighting.**

3. High intensity discharge ballasts shall be constant wattage type; have power factor of not less than 90%; be NRTL tested and have CBM label. Sound rating shall be "B" with sound levels less than 30 dBA, where ballasts are used in indoor luminaires in occupied areas. Ballasts shall be encased and potted. Starting current shall not exceed operating current. Ballast shall maintain lamp operation for voltage fluctuations of plus or minus 10% of rated voltage. The voltage rating of each ballast shall correspond to the voltage of the circuit to which the ballast will be connected. Ballasts for exterior luminaires shall be rated for operation at ambient temperatures to minus 20°F. All ballasts shall have a two (2) year material and labor guarantee.

D. Fluorescent and Compact Fluorescent Emergency Ballasts:

- 1. All emergency ballasts shall be inverter type with the following minimum requirements:
  - a. Shall operate indicated lamps at nearly full illumination for a minimum of 90 minutes.



- b. Upon loss of normal power, luminaire shall automatically switch to inverter ballast with battery.
- c. Upon restoration of normal, luminaire shall return to normal power and ballast shall return to charging mode.
- d. Battery shall be maintenance free, nickel-cadmium type, and be an integral part of ballast assembly. Life expectancy of battery shall be a minimum of seven years.
- e. Assembly shall be UL listed and approved under UL924 - "Emergency Lighting and Power Equipment".
- f. Shall include an emergency test switch with LED indicator remotely mounted in outlet box in ceiling above or adjacent to luminaire integral to luminaire mounted in a common utility/mechanical room mounted where indicated.
- g. Design Make: 32W T8 Fluorescent - Bodine "B30"; 13W compact fluorescent - Bodine "B413", 26W compact fluorescent - Bodine "426".
- h. Manufacturer: Bodine or approved equal.

E. Lenses:

- 1. Shall be listed materials tested in accordance with ASTM D-635, "Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position" and burns less than 2/5 inches per minute.
- 2. The products shall have a smoke density of less than 75 when tested in accordance with ASTM D-2843, standard test method for "Density of Smoke from the Burning or Decomposition of Plastics".
- 3. The flame spread rating shall not exceed 0-25 and smoke developed rating shall not exceed 450 in accordance with ASTM E-84, standard test method for "Surface Burning Characteristics of Building Materials".
- 4. Self-ignition shall not occur below 600°F, in accordance with ASTM D-1929, standard test method for "Ignition Properties of Plastics".
- 5. Materials shall remain in place 15 minutes at 175°F and fall from frame at 200° below ignition temperature in accordance with ASTM D-648, "Deflection Temperature of Plastics Under Flexural Load".

F. Wiring:

- 1. Wiring within lighting fixture for connection to branch circuit shall be:
  - a. NEC Type AF for 120 volt, minimum No. 18 AWG.
  - b. NEC Type SF-2 for 277 volt, minimum No. 18 AWG.
- 2. Stranded wire within lighting fixture shall be lead dipped.

G. General:

- 1. Parabolic open cell luminaires shall have reflector channels for symmetrical distribution at all lamp operations. A minimum of two channels shall be provided.

H. Sockets - Lampholders:

1. Lampholders shall be of porcelain or bakelite with a 660 watt, 660 volt rating. Lampholders approved for use may be the type providing for screw-type wire terminal connections or the type of socket provided with attached leads, or the type permitting push-in locking connection of the ballast wiring; Makes: Bryant, Leviton or Kulka or approved equal. Sockets shall be attached to the socket bars by means of screw/nut arrangement or any other approved means that will insure solid mounting and support of the lampholders. Lampholders shall be of the pressure lock or push-in-and-hold type, and shall be UL listed.

I. Exit Luminaires:

1. Electrical Characteristics:
  - a. LED type for 120/277 volt supply.
  - b. Use two LED strips for indirect illumination of the face. Meet or exceed illumination requirements of NFPA 101, and all of the requirements of UL924.
  - c. Maximum input power of 5 watts per illuminated face.
2. Construction:
  - a. Cast aluminum housing.
  - b. Natural brushed aluminum faceplates(s).
  - c. Black finish for frame.
  - d. 6 in. H x 2 in. W x 3/4-in. stroke exit letters on cast stencil face.
  - e. Red fiberglass reinforced polyester diffusing panel(s).
  - f. Removable snapouts provided in stencil face housing for right, left, or double directional arrows.
  - g. Luminous bottom with prismatic lens for even downlighting.
  - h. Light tight assembly.
  - i. Provide wire guard for Gymnasium exits.
  - j. Provide Universal mount unit.
  - k. Provide single or double face and arrows as indicated on Contract Documents.
  - l. Design Equipment: Dual Lite Sempra Series.
  - m. Acceptable Manufacturers: Emergi-Lite Prestige, Siltron Vanguard II, Lithonia Signature or approved equal.

J. Emergency Battery Pack Luminaries:

1. Completely self-contained in compact, low profile injection molded UL 94V-0 flame rated thermoplastic housing with universal mounting plate.
2. Premium grade, pure lead maintenance free battery. Two with sufficient capacity to operate the lamps for 1-1/2 hours to an end voltage of 87-1/2% of nominal battery voltage. Three stage charger (constant current, equalize and float charge), relay, low voltage battery disconnect and brownout protection circuits.

3. Two fully adjustable glare-free sealed halogen beam type lighting heads.  
Test switch and charge rate indicator.
  4. Universal 120/277 volt supply.
- K. Luminaire Schedule:
1. Luminaire schedule is found on contract drawings.

### **PART 3 - EXECUTION**

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#### **3.1 GENERAL INSTALLATION**

- A. Provide for every luminaire shown on the plans, as scheduled on the drawings.
- B. Where a luminaire is specified or approved for certain locations, all luminaires in those locations must be of the same manufacturer and style. All luminaires shall be NRTL tested.
- C. Obtain exact location of all ceiling and wall mounted luminaires from the Architect/Engineer.
- D. Luminaire fasteners or hangers shall be capable of supporting four times the luminaire weight.
- E. Luminaires shall be supported independent from ceiling system or other building services. Support luminaires at two locations, using #10 steel wire similar to that used to support the ceiling grid. Directly attach steel wire to structural member.
- F. Mount luminaires in true vertical and horizontal alignment. Offset luminaires as required to avoid obstructions. Provide all necessary hangers and supports for proper luminaire installation. Such supports shall be anchored to channels in the ceiling construction, to the structural slab or to structural members above the suspended ceiling.
- G. Provide all necessary accessories for "end-to-end" mounting where continuous rows of fluorescent luminaires are indicated. All luminaire assemblies shall be grounded.
- H. New luminaires may be provided to replace existing luminaires scheduled to remain or be reused, subject to shop drawing approval.

#### **3.2 SURFACE CEILING MOUNTING**

- A. Mount surface luminaires tight to surface in a manner such that mounting surface does not distort fixture.
- B. Luminaires installed in continuous rows may be fed by a single outlet if fixtures are UL approved and suitable for through wiring in luminaire raceway.
- C. Luminaire fasteners or hangers shall be capable of supporting four times luminaire weight.

- D. Luminaires shall be supported independent from ceiling system or other building services.

### 3.3 RECESSED MOUNTING

- A. The Electrical Contractor shall verify ceiling type, construction, and material prior to placing an order for recessed luminaires.
- B. The Electrical Contractor shall furnish fixtures with an IC rating for all recessed incandescent fixtures installed in direct contact with insulation.
- C. The Electrical Contractor shall furnish and install plaster frames for plaster ceilings and flanged frames for drywall ceilings.
- D. The Electrical Contractor shall furnish and install all required mounting hardware and accessories to adapt fixtures to ceiling construction.
- E. Lay-in type luminaires shall be supported independent of the ceiling system at each end of the luminaire with galvanized support wire.
- F. Provide and install seismic hold-down clips for all lay-in type lighting fixtures.

### 3.4 PENDANT MOUNTING

- A. Mount pendant mounted luminaires from 1/4 in. threaded rods of required length.
- B. Sleeve threaded rods with 1/2 in. EMT painted with color as directed by Architect/Engineer.
- C. Luminaires installed in continuous rows may be fed by a single outlet if they are UL approved and suitable for through wiring in luminaire raceway.

### 3.5 REMOTE BALLASTS

- A. Remote ballasts shall be mounted in an approved NEMA 1 enclosure. Remote ballasts shall be located in areas easily accessible to maintenance personnel.
- B. Wiring from luminaire to remote ballast shall not exceed the ballast manufacturer's recommendations for distance.
- C. Remote ballast shall be clearly labeled indicating fixture served, voltage, panelboard and circuit number served from.

### 3.6 AIRCRAFT CABLE SUSPENSION

- A. Cables shall be 1/16 in. aircraft cable with end safety fittings. Cable shall be provided with 2 in. diameter mini-canopy and threaded coupler for attachment to a 1/4 in.-20 threaded stud extending 3/4 in. below ceiling.
- B. Cable assembly shall include a spring-loaded adjustment device mounted in the fixture.

- C. The Contractor shall be responsible for providing required supports for cable attachment.
- D. For cord feed to the luminaire provide continuous cord clip of matching color to attach the cord to the cable.
- E. Support per manufacturer's recommendations.

### 3.7 COVE LIGHTING

- A. Fluorescent cove lighting shall be installed so as to produce a continuous and unbroken band of light with no shadows or light gaps.
- B. A combination of 2 ft., 3 ft. and 4 ft. lamp fixtures may be required to accomplish a continuous band of light.

### 3.8 LAMPS

- A. Furnish and install required lamps in all luminaires. Any lamp which fails prior to project close-out shall be replaced at no additional cost.
- B. Replace any lamp or lamps whose color is determined to be unsatisfactory.

### 3.9 BALLASTS

- A. Furnish and install ballasts for all luminaires requiring ballasts.
- B. To facilitate multi-level lamp switching, lamps within fixture shall be wired with the outermost lamp at both sides of the fixture on the same ballast, the next inward pair on another ballast and so on to the innermost lamp (or pair of lamps). Within a given room, each switch shall uniformly control the same corresponding lamp (or lamp pairs) in all fixture units that are being controlled.
- C. Provide two-lamp ballasts for fixtures with two (2) fluorescent lamps or multiples of two (2) lamps. On four (4) lamp luminaires, the two (2) outside lamps shall be on one ballast and the two (2) inside lamps shall be on the other ballast.
- D. Where three-lamp luminaires are indicated, unless switching arrangements dictate otherwise, utilize a common two-lamp ballast to operate the center lamp in pairs of adjacent units that are mounted in a continuous row. The ballast luminaire and the slave-lamp luminaire shall be factory wired with leads or plug devices to facilitate this circuiting. Individually mounted luminaires and the odd fixture in a row shall utilize a single-lamp ballast for operation of the center lamp. Contractors shall verify lengths of factory wired leads.
- E. Dimming ballasts and lamps shall be burned in at full brightness for a minimum of 100 hours prior to being used for dimming. Keep a record of all rooms with dimming luminaires and when the lamps and ballasts were burned in. Submit this record with the lighting operation and maintenance manual.

**3.10 GROUNDING**

- A. Ground all non-current carrying parts of all lighting fixtures.
- B. All grounding shall be accomplished with NRTL tested grounding connectors suitable for this purpose.

**3.11 FINAL CLEANING**

- A. Immediately prior to acceptance, damp clean diffusers, glassware, luminaire trim, reflectors, lamps, louvers, lens and similar objects of all luminaires. Remove all dirt, corrosion, foreign material, finger marks, and blemishes. Replace all burned out lamps and failed components.

**3.12 REMOVAL OF BALLASTS IN EXISTING LUMINAIRES**

- A. Assume ballasts contain PCB material unless labeled otherwise or test samples show materials are not PCB; submit a test report. Remove all ballasts from existing luminaires indicated on contract documents. Dispose of all ballasts which do not have non PCB labels in PCB containers and pay all costs to have containers taken to EPA approved incinerators and disposed of all EPA regulations. Follow all EPA regulations for transporting material. If ballast has leaked in existing luminaires, remove material deposited in luminaire and dispose of those materials as indicated above. Provide documentation verifying disposal of PCB contaminated ballasts.

**3.13 REMOVAL OF LAMPS IN EXISTING LUMINAIRES**

- A. The Contractor shall employ the service of a certified disposal/recycling service company to dispose of all removed fluorescent and/or HID lamps. All disposal procedures shall be performed in accordance with EPA Requirements and Subtitle C for the disposal of mercury contaminated lamps.

**END OF SECTION**

## SECTION 33 05 13 ACCESS HATCHES

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### PART 1 - GENERAL

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#### 1.1 SUMMARY

- A. This Section includes aluminum access hatches, complete with all accessories as shown on the Contract Drawings.

#### 1.2 REFERENCES

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications except where more stringent requirements have been specified herein:
  - 1. American Society for Testing and Materials (ASTM)

#### 1.3 SUBMITTALS

- A. In addition to the submittals specified in the General and Special Conditions, the Contractor shall submit the following:
  - 1. Shop Drawings and Product Data
    - a. Drawings of the access hatches, including dimensions, weights, support details, hinges, and connection details.
    - b. Manufacturer's literature, specifications and data sheets for the hatches and support structure.
    - c. Product delivery, storage, handling, and installation instructions for all equipment in this Section.
    - d. Manufacturer's equipment warranty.
  - 2. Certificates
    - a. Manufacturer's certification that all materials furnished are in compliance with the applicable requirements of the referenced standards and this specification.

### PART 2 - PRODUCTS

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#### 2.1 MANUFACTURERS

- A. The following manufacturers are named to establish a standard of quality necessary for the project:
  - 1. The Bilco Company
  - 2. Syracuse Castings
  - 3. Or approved equal

## 2.2 MATERIALS OF CONSTRUCTION

- A. Cover
  - 1. Cover shall be constructed from ¼-inch thick aluminum and reinforced to support AASHTO H-20 loading with a maximum deflection of 1/150th of the span.
  - 2. A continuous EPDM gasket shall be mechanically attached to the aluminum frame to create a barrier around the entire perimeter of the cover and significantly reduce the amount of dirt and debris that may enter the channel frame.
  - 3. Operation shall not be affected by temperature and shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
  - 4. Shall be equipped with a hold open arm that automatically locks the cover in the open position.
- B. Channel frame shall be ¼-inch thick aluminum with a full anchor flange around the perimeter. Frame shall be cast flush into the reinforced flat cover.
- C. Hinges
  - 1. Shall be heavy forged aluminum with a Type 316 stainless steel pin.
  - 2. Shall pivot so the cover does not protrude into the channel frame.
  - 3. Shall be specifically designed for horizontal installation.
  - 4. Shall be through bolted to the hatch with tamperproof Type 316 stainless steel lock bolts.
  - 5. Shall be through bolted to the frame with Type 316 stainless steel bolts and locknuts.
- D. Latch
  - 1. Shall use a removable exterior turn/lift handle with a spring loaded ball detent to open the cover.
  - 2. Latch release shall be protected by a flush, gasketed, removable screw plug.
- E. Hardware
  - 1. All hardware shall be Type 316 stainless steel.
  - 2. Type 316 stainless steel snap lock with fixed handle shall be mounted on the underside of the cover.
  - 3. Necessary hardware shall be provided to lock the access hatch from the exterior of the structure.
- F. Finish: Factory finish shall be mill finish aluminum with bituminous coating applied to the exterior of the frame.

## PART 3 - EXECUTION

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### 3.1 INSTALLATION

- A. Hatches shall be installed in accordance with the configuration shown on the Contract Drawings and in accordance with the manufacturer's installation procedures.

### 3.2 FIELD TESTING

- A. Contractor shall perform leak testing to ensure the access hatch is water tight.

**END OF SECTION**



## SECTION 35 20 16 SLUICE GATES

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### PART 1 - GENERAL

---

#### 1.1 SUMMARY

A. Section Includes:

1. Requirements for providing a sluice gate and appurtenances, complete with guides, frames, brackets, anchor bolts, stem and stem guides, manual operators and accessories in accordance with the Contract Documents.

#### 1.2 REFERENCES

A. Material and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein

1. American Water Works Association (AWWA) Standards
  - a. C563: Fabricated Composite Sluice Gates.
  - b. C561: Fabricated Stainless Steel Sluice Gates.
2. American Society for Testing and Materials (ASTM) Standards.
3. American Society of Mechanical Engineers (ASME) Standards.
4. The Society of the Plastics Industry, Inc. (SPI).

#### 1.3 SUBMITTALS

A. In addition to the submittals specified in the General Conditions and Section 01 33 00, entitled "Submittal Procedures," submit the following:

1. Shop drawings indicating the dimensions, material of construction, size and weight of equipment and location of connections to other work.
2. Manufacturer's data including catalog information, cut sheets, manufacturer's specifications, and materials description.
3. Manufacturer's affidavit that the gate and all materials furnished are in compliance with the applicable provisions of the latest edition of the AWWA Standard and this Specification.
4. Suggested spare parts list with current price information.
5. Requirements for handling, storage and protection prior to installation.
6. Manufacturer's installation recommendations.
7. Requirements for routine maintenance prior to equipment startup.
8. Manufacturer's Certificate of proper installation.
9. Manufacturer's warranty.

B. Certificates

1. Manufacturer's certification that all materials furnished are in compliance with the applicable requirements of the referenced standards and this specification.

2. Certificate of installation.
- C. Operations and Maintenance Manuals
  1. Provide copies of the manufacturer's operation and maintenance manuals in accordance with Section 01 78 23 entitled "Operations and Maintenance Data."

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
  1. Manufacturer shall have a minimum of ten years of experience in 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. References and evidence of experience shall be provided if requested by the CONSULTANT.
- B. Component Supply and Compatibility
  1. All equipment in this Section shall be supplied by a single manufacturer who shall be responsible for the design, coordination and proper operation of the entire system. Sluice gates shall be fabricated, assembled, erected and placed in proper operating condition in full conformity with the drawings, specifications, engineering data, instructions and recommendations of the equipment manufacturer.
  2. All equipment of like size and type shall be of the same manufacturer of the purpose of parts interchangeability.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Care shall be used in the handling and storage of this equipment to prevent damage or distortion of the equipment prior to installation. Materials and equipment shall be protected from exposure to the elements and kept dry at all times. Materials and equipment shall be handled and stored in accordance with the manufacturer's recommendations.
- B. Materials and equipment shall be boxed, crated or otherwise completely enclosed and protected during shipment, handling, and storage. Such boxes, crates or protection shall be clearly labeled with manufacturer's name and model designation.
- C. Material and equipment damaged by handling and storage shall be repaired or replaced by the CONTRACTOR as directed by the CONSULTANT.

#### 1.6 WARRANTY

- A. The manufacturer shall warrant the sluice gates against defects in materials and workmanship for a period of two (2) years in accordance with the General Conditions.
- B. The warranty shall be in published form and shall apply to all similar units.

### PART 2 - PRODUCTS

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#### 2.1 MANUFACTURERS

- A. The following manufacturers are named to establish a standard of quality necessary for the Project:
  1. Plasti-Fab, Inc.
  2. Fontaine Ltd.

3. Or approved equal.

## 2.2 GENERAL

- A. All parts shall have accurately machined mounting and bearing surfaces so that they can be assembled without fitting, chipping, or remachining. All parts shall conform accurately to the design dimensions and shall be free of all defects in workmanship or material that shall impair their service. The sluice gate shall be completely shop assembled to insure proper fit and adjustment of all parts.
- B. Gates may be constructed of fiberglass reinforced plastic (FRP) or stainless steel.
- C. Construction of the sluice gate shall be in accordance with the latest edition of the AWWA Standards for the material chosen.
- D. All drilled holes shall be spotfaced to insure ample bolt and nut bearing surfaces.
- E. Wherever the term "stainless steel" is used in this Specification, Type 304 stainless steel shall be provided unless otherwise noted.
- F. The minimum thickness of the gate, its reinforcing members and all structural components of the guide and frame shall be ¼ inch.
- G. Leakage under design seating head conditions is not to exceed 0.10 gpm/ft of seating perimeter.

## 2.3 MATERIALS AND CONSTRUCTION

### A. FRP Sluice Gate

Components	Materials
Frame and Guides	FRP, Type 1, Grade 10, per SPI Quality Assurance Report, RTP Corrosion Resistance Equipment
Gate	FRP, Type I, Grade 10, per SPI Quality Assurance Report, RTP Corrosion Resistance Equipment
Stem	Stainless Steel, Type 304, ASTM A276
Fasteners, Nuts and Bolts	Stainless Steel, Type 316, ASTM A276
Seals	Neoprene, ASTM D2000 or Ultra-High Molecular Weight Polyethylene (UHMW), ASTM D4020
Lift Nuts and Thrust Nuts	Bronze, ASTM B584
Wall Brackets	Stainless Steel, Type 304, ASTM A276

### B. Stainless Steel Sluice Gate

Components	Materials
Frame and Guides	Stainless Steel, Type 304
Gate	Stainless Steel, Type 304, ASTM A240
Stem	Stainless Steel, Type 304, ASTM A276
Fasteners, Nuts and Bolts	Stainless Steel, Type 316, ASTM A276
Seals	Neoprene, ASTM D2000 or Ultra-High Molecular Weight Polyethylene (UHMW), ASTM D4020
Lift Nuts and Thrust Nuts	Bronze, ASTM B584
Wall Brackets	Stainless Steel, Type 304, ASTM A276

C. Frame

1. Sluice gate frame shall be of one-piece construction and shall be of a flat back design to allow wall mounting without a box-out into the concrete opening. A full faced EPDM or neoprene gasket shall be installed between the back face of the frame and the concrete wall. Sluice gate frame and gasket shall be mounted directly to the concrete wall using stainless steel anchor bolts.
2. Frame shall be designed to accommodate removal and replacement of the gate.
3. All contact surfaces of the frame shall be machined.

D. Guides

1. The guides shall be integral with the gate frame. Guides shall be designed to withstand the total thrusts due to water pressure and wedge action.
2. The guides shall be of such lengths as to retain the entire gate within the guide grooves when the gate is fully open. The upper portion of the guides shall be further attached by anchor bolts embedded in the wall.

E. Gate

1. Gate shall be square in shape and of one-piece construction.
2. Gate shall not deflect more than 1/360 of the gate span in any direction under the seating head.
3. FRP sluice gate:
  - a. FRP sluice gate shall be constructed of a 1/8-inch glass mat laminate that shall meet the following minimum physical properties.

Tensile strength:	14,700 psi
Flexural modulus:	800,000 psi
Flexural strength:	23,300 psi
Impact strength:	9.0 ft-lbs/in
Water absorption:	0.13% (in 24 hours)

- b. FRP sluice gate shall be of a sandwich core construction with structural reinforcing to attain the necessary stiffness to meet specified deflection requirements. The structural reinforcing shall be completely encapsulated in a laminate not less than 1/8-inch thick on each side.
4. Stainless steel sluice gate:
  - a. Stainless steel sluice gate shall have structural components not less than 1/4-inch thick, with horizontal and vertical strengthening ribs, integrally cast of 304 stainless steel.
5. A resilient neoprene seal shall be attached to the bottom of the disc.
6. Seals shall be mounted on the gate with stainless steel or FRP clamping bars and stainless steel fasteners.

F. Stem

1. Stem shall be the rising type with sight gauge and shall be provided with a removable manual 18-inch diameter hand wheel operator mounted on a square nut operating head.
2. Handwheel shall be provided with an offset pedestal in accordance with the Contract Drawings.

3. Stem shall be a minimum of 1-1/2 inch root diameter, with Acme threads.
  4. Stem shall be designed to transmit in compression a minimum of two times the rated output of the hoist at 40 pounds effort on the crank.
- G. Stem Couplings
1. Stem couplings shall be machine bored, and internally threaded with Acme threads to fit threaded stem ends.
  2. Stem couplings shall be further secured to stem ends by silicon bronze or stainless steel pins.
- H. Stem Guides
1. Stem and extensions shall be supported with stem guides. The unsupported length shall be in accordance with the manufacturer's recommendations and shall not exceed a maximum L/r ratio of 200 except where required by gate travel.
  2. Stem guides shall be machine bored 1/16 inch larger than the stem diameter.
  3. Guides shall be held to the wall by anchor bolts.
- I. Seals
1. Shall be provided to limit leakage to 0.10 gpm/foot of seating perimeter under design seating head conditions.
  2. Seals shall be attached to the gate using stainless steel hardware.
  3. Seals shall be resilient and shall be of neoprene or UHMW.
  4. All seals shall be replaceable without dewatering the gate.

## 2.4 ANCHOR BOLTS AND HARDWARE

- A. All necessary attaching bolts, anchor bolts, mounting and assembly hardware shall be of Type 316 stainless steel and shall be furnished by the manufacturer.

## PART 3 - EXECUTION

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### 3.1 INSTALLATION

- A. Sluice gate and accessories shall be stored and handled in accordance with the manufacturer's recommendations and the applicable provisions of the AWWA standards for the material chosen.
- B. Insofar as practical, the sluice gate assembly shall be completely factory assembled, shipped as a unit, disassembled onsite and installed in strict conformance with the manufacturer's recommendations.
- C. Stem guides shall be set so that the stem is in perfect alignment and runs smoothly.
- D. All stainless steel bolts shall be coated with an antigalling compound before the nuts are attached and tightened.
- E. Sluice gate shall be thoroughly cleaned prior to installation.

### 3.2 OPERATION

- A. Ease of Operation.
1. Adjustments in stem alignment or other changes required for maximum ease of operation shall be made at the CONTRACTOR's expense.

### 3.3 FIELD TESTING

- A. The following field testing shall be performed on the sluice gate:
1. Pre-test Checkout
    - a. The CONTRACTOR shall adjust, test and operate the gate manually. Manually open and close each gate two times using the handwheel.
    - b. Manufacturer shall inspect the unit and certify proper installation and adjustments, either prior to or concurrent with the pre-test checkout. The CONTRACTOR shall submit the Manufacturer's Certificate of Installation to the CONSULTANT prior to commencing the Leakage Test.
    - c. Prior to commencing the Leakage Test, the CONTRACTOR shall construct temporary bulk head(s) in structures, pipes or manholes as required to properly conduct the leakage test.
  2. Leakage Test
    - a. Fill the distribution structure with thickened sludge and test for leakage. Leakage under design seating head conditions shall not exceed 0.10 gpm/foot of seating perimeter.

### 3.4 SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. The services of the manufacturer's representative shall be provided by the sluice gate manufacturer during installation, testing, startup and adjustment.
- B. The manufacturer's representative shall provide the following services at a minimum:
1. 4 hours minimum for installation assistance and inspection, including providing a certificate of installation.
  2. 4 hours minimum for startup and leakage testing.
- C. Additional on-site time shall be provided at the CONTRACTOR's expense as necessary to assure that equipment is installed and operating correctly and in accordance with the Contract Documents.
- D. The OWNER's personnel shall have the right to witness the activities of the manufacturer's representative during installation, testing, startup and adjustment.

### 3.5 EQUIPMENT SCHEDULE

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

Location:	Nominal Size	Maximum design operating water elevation:
Coagulation Basin No. 3 Influent Channel	12" x 12"	18'
Coagulation Basin No. 4 Influent Channel	12" x 12"	18'
Coagulation Basin No. 5 Influent Channel	12" x 12"	18'

END OF SECTION

## SECTION 40 05 03 MECHANICAL IDENTIFICATION

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### PART 1 - GENERAL

---

#### 1.1 SUMMARY

- A. This Section includes identification of piping and valves, as shown on the Contract Drawings.

#### 1.2 REFERENCES

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:
1. American National Standards Institute (ANSI)
    - a. ANSI A13.1 - Scheme for the Identification of Piping Systems.

#### 1.3 SUBMITTALS

- A. Submit the following Shop Drawings in accordance with the applicable sections of the General Conditions:
1. For each product specified submit manufacturer's catalog sheets and specifications showing its compliance with this specification and the referenced standards.
  2. Submit, for review, samples of symbols and abbreviations, letter size, color for coding, and a complete list of legend wording proposed for mechanical identification. Do not order or purchase identification materials until samples have been reviewed.
  3. Quality Control Submittals
    - a. Submit manufacturer's installation instructions.
    - b. Submit, for review, sample format for valve service identification chart(s) containing (as a minimum) the following information:
      - 1) Valve tag number.
      - 2) Valve location.
      - 3) Valve function and service.
      - 4) Valve manufacturer's name and model number.
  4. Certificates
    - a. Manufacturer's certification that all products are in compliance with the applicable requirements of the referenced standards and this specification.
  5. Contract Closeout Submittals
    - a. Submit final valve service identification chart(s), framed as specified below.

#### 1.4 QUALITY ASSURANCE

- A. Identifying labels and markings for piping shall conform to ANSI A13.1 for legend, color, visibility, and size of legend and letters.

**1.5 SEQUENCE AND SCHEDULING**

- A. Complete all testing, insulation, and finish painting prior to executing the Work of this Section.

**PART 2 - PRODUCTS**

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**2.1 MANUFACTURERS**

- A. Seton Identification Company, Branford, Connecticut.
- B. Brady Corporation, Milwaukee, Wisconsin.
- C. Or approved equal.

**2.2 MATERIALS**

- A. Pipe Identification Painting
  - 1. Type and color shall be as identified in Section entitled "Field Painting."
- B. Pipe Identification Markers:
  - 1. Snap-On Type: Precoiled acrylic plastic marker with clear polyester coating, incorporating flow arrows, and legend printed in alternate directions.
    - a. Piping or insulation under 6 inch O.D.: One piece wrap around type with 3/4 inch adhesive strip on inside edge and 360 degree visibility.
    - b. Piping or insulation 6 inch O.D. and larger: Strip type with factory applied grommets, secure with stainless steel spring fasteners.
  - 2. Stick-On Type: One piece pressure sensitive adhesive backed plastic marker with clear polyester coating, incorporating flow arrows, and legend printed in alternate directions.
    - a. Piping or insulation under 8 inch O.D.: Wrap around type with 360 degree visibility.
    - b. Piping or insulation 8 inch O.D. and larger: Strip type.
  - 3. Markers shall be color coded based on pipe contents. Color selection shall be according to chart in Part 3 of this Section.
- C. Pipe Banding Tape:
  - 1. 1-1/2 inch width (minimum), pressure sensitive adhesive backed type, of same material as pipe identification marker, and of color to match background color of pipe identification marker.
- D. Pipe Service Identification Tags:
  - 1. Type: Brass, 19 B&S gage, with 1/4 inch high pipe service abbreviated lettering over 2-inch high pipe size lettering. Lettering shall be deep stamped and black filled. Tag to have 3/16 inch diameter hole at top for fastening.
  - 2. Size: 2 inch square tag.
  - 3. Fasteners: Brass "S" hook or brass jack chain, size as required for pipe to which tag is attached.
- E. Valve Identification Tags:
  - 1. Type: Brass, 19 B&S gage, with 1/4 inch high valve service abbreviated lettering over 1/2 inch high lettering indicating valve service chart number. Lettering shall be deep stamped and black filled. Tag to have 3/16 inch diameter hole at top for fastening.
  - 2. Size: 1-1/2 inch diameter square tag.



3. Fasteners: Brass "S" hook or brass jack chain, size as required for valve stem or handle to which tag is attached.
  4. For chemical storage rooms, materials of construction for the valve tag and fastener shall be compatible with the chemical being stored within the room.
- F. Equipment Identification Letters & Numbers:
1. Type: Stick-on type, made of all purpose polyester, single character letters and numbers, specifically designed for intended use (i.e. outdoor, chemical, etc.).
  2. Color: Black letters on white background.
  3. Size: Letters and numbers shall be 1 inch or 3 inches in height, as specified.

### 2.3 ACCESSORIES

- A. Valve Service Identification Chart Frames:
1. Satin finished extruded aluminum frame of size to fit 8-1/2 x 11 inch valve chart and complete with rigid clear plastic glazing.

## PART 3 - EXECUTION

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### 3.1 PIPE IDENTIFICATION PAINTING

- A. General
1. Piping within areas designated below shall be painted with various colors to identify the contents.
  2. If the piping is insulated, then the insulation cover shall be painted and not the pipe.  
EXCEPTION: Do not paint metal insulation jackets, regardless of location.
- B. Areas for Pipe Identification Painting:
1. Piping within the following spaces or rooms shall be painted:
    - a. Exposed piping in corridors or other finished spaces which does not have a metal insulation jacket.
- C. Application of Paint:
1. Prepare and paint designated piping and/or insulation in accordance with Section entitled "Field Painting."
  2. Coverage of designated piping or insulation shall be complete and free of streaking of defects.
- D. Cleaning:
1. Clean adjacent surfaces of paint spatters and drips resulting from the Work of this Section.
- E. Pipe Painting Color Code Schedule: Refer to Section entitled "Field Painting."

### 3.2 PIPE IDENTIFICATION MARKERS AND TAGS

- A. General:
1. Piping shall be identified as to content and direction of flow by use of pipe identification markers or tags.
  2. Identify all piping, bare or insulated, whose contents match those listed in the Pipe Identification Schedule (Paragraph F, below), with the following exceptions:

- a. Piping in furred spaces or above plastered ceilings, except at access panels where valves and piping shall be identified as specified for exposed piping.
  - b. Piping in finished spaces such as offices, toilet rooms, locker rooms, etc.
3. Marker legend size, field color, and length of field shall be in accordance with ANSI A13.1.
  4. Legend wording shall be developed by the CONTRACTOR and submitted for review. Whenever possible, standard terminology should be used. Identification by the combination of two or more standard labels (at each identification point) is acceptable.
- B. Use of Markers or Tags:**
1. Pipe or insulation with an outside diameter (O.D.) of 3/4 inch and less shall be identified by the use of Pipe Service Identification Tags.
  2. Pipe or insulation with an O.D. larger than 3/4 inch shall be identified by the use of Pipe Identification Markers.
  3. Either snap-on or stick-on type markers may be used; except that stick-on markers shall not be used in the following situations:
    - a. Areas where humid, wet, or dripping conditions are found or likely.
    - b. Areas where chemical fumes are present or likely.
    - c. Outdoor installations.
    - d. On lines subject to 50 degree F temperature variations.
- C. Location of Markers and Tags:**
1. Pipe markers and tags shall be located so as to be readily visible from any reasonable point of observation.
  2. Locate identification at all valves, branch or riser take-offs, and both sides of pipe passage through walls, floors, and ceilings.
  3. On continuous pipe runs locate identification at 20 foot intervals, but not less than one marker or tag on any length of 10 feet or greater.
- D. Preparation:**
1. Insure that any painting is complete and the paint has thoroughly dried before applying identification.
  2. Prepare surface in accordance with the manufacturer's instructions for the type of identification used and the surface to which it is applied.
- E. Installation:**
1. Install markers and tags in accordance with the manufacturer's instructions.
  2. Secure both ends of stick-on type markers with 360 degree application of pipe banding tape. Tape shall have one inch lap on pipe or insulation.
- F. Pipe Identification Schedule:** Identify the following types of piping with markers and/or tags.

Pipe Service	Label Abbreviation	Background Color	Letter Color
Cold Water, Potable	CW	Green	White
Drain/Waste	D/W	Yellow	Black

Pipe Service	Label Abbreviation	Background Color	Letter Color
Hydrofluorosilicic Acid (Fluoride)	HFS	Yellow	Black
Potassium Permanganate	KMNO4	Yellow	Black
Plant Water	PW	Green	White
Potable Water	W	Green	White

### 3.3 VALVE IDENTIFICATION

#### A. General:

1. Valves shall be designated by distinguishing numbers and/or letters as scheduled and as shown on the Contract Drawings.

#### B. Installation:

1. Fasten tags to valve stems or handles using brass "S" hooks or jack chain.
2. Fasten tags in a manner and location that will permit easy reading, but will not interfere with the operation of the valve.

#### C. Valve Service Identification Chart:

1. Provide two framed valve charts for each piping system to have valve identification tags.
2. Charts shall be typed, in the reviewed format, on 8-1/2 x 11 inch heavy white bond paper and framed in an aluminum frame.
3. Hang framed charts at location(s) directed.

**END OF SECTION**

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**SECTION 40 05 07**  
**HANGERS AND SUPPORTS FOR PROCESS PIPING**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. This Section includes hangers, supports, and restraints, complete with all accessories, for process piping systems, as shown on the Contract Drawings or specified herein.

**1.2 REFERENCES**

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:
1. American Society of Mechanical Engineers (ASME)
  2. Manufacturers Standardization Society (MSS)
  3. American Society for Testing and Materials (ASTM)
  4. American National Standards Institute (ANSI)
  5. American Standards Association, Inc. (ASA)

**1.3 SUBMITTALS**

- A. Shop Drawings:
1. Submit the following for approval:
    - a. Detailed shop drawings including plans, elevations and laying schedules for piping supports, hangers and restraints for process piping systems. Include design calculations, size, materials of construction, and fabrication details.
    - b. Details of intermediate structural steel members required to span main structural steel for support of piping.
    - c. Details of methods for attachment of hangers and supports to building construction for equipment and piping 4 inches and larger.
    - d. Details of guide and anchor installations.
    - e. Details of trapeze hangers.
- B. Product Data:
1. Manufacturer's literature, specifications and engineering data for each type of pipe hanger, support and restraint indicated in the Contract Documents for process piping systems.
- C. Certificates:
1. Manufacturer's certification that all materials furnished are in compliance with the applicable requirements of the referenced standards and this specification.
  2. Copies of welding certificates for welding procedures and operators.

## 1.4 QUALITY ASSURANCE

- A. Component Supply and Compatibility:
  - 1. All supports, hangers and restraints of the same materials for process piping systems shall be supplied by a single manufacturer who shall be responsible for the proper application, engineering and testing as specified herein.
- B. Qualify welding processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

## PART 2 - PRODUCTS

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### 2.1 MANUFACTURERS

- A. The following manufacturers are named to establish a standard of quality necessary for the project:
  - 1. Anvil International, Inc. (previously Grinnell Company)
  - 2. Empire Industries
  - 3. Or approved equal.

### 2.2 GENERAL

- A. Hangers and supports shall be adequate to maintain the supported load in proper position under all operating conditions.
- B. Factor of Safety
  - 1. Hangers and supporting devices shall be designed to provide a minimum working safety factor of 3.5.
  - 2. The safety factor for pipe hangers and supports shall be based on supporting the pipe completely full with the liquid being conveyed.

### 2.3 MATERIALS OF CONSTRUCTION

- A. Hangers and Supports for Humid Environments
  - 1. Hangers, supports, struts and accessories located in humid environments shall be Type 316 stainless steel with Type 316 stainless steel hardware.
  - 2. Humid environments shall be as classified on the Contract Drawings.
- B. Hangers and Supports for Exterior Locations.
  - 1. Hangers, supports, struts and accessories located in exterior locations shall be Type 316 stainless steel with Type 316 stainless steel hardware.
- C. Hangers, supports, struts and accessories located in other locations shall be hot-dip galvanized with Type 316 stainless steel hardware.
- D. General Requirements
  - 1. Piping used for supports shall be in accordance with the following standards:
    - a. Wrought Steel Pipe - ASTM Des: A 53 Schedule 40
    - b. Cast Iron Pipe - ASA Des: 21.6 and 21.8, Thickness Class 22

2. Structural steel, wrought metals and metal castings used for hangers and supports shall meet the requirements of the applicable Sections.

#### E. Hangers

1. Overhead hangers for pipes eight inches in diameter and smaller shall be supported by threaded hanger rods and shall be adjustable Split Ring Type. Construction shall be malleable iron, black finish, Underwriters Laboratory (UL) listed and Factory Mutual (FM) approved.
2. Overhead hangers for pipes 10 inches in diameter and larger, and for smaller pipes where shown or specified on the Contract Drawings, shall be adjustable clevis or single roll and socket type.
3. Ceiling flanges shall be utilized for pipes 8 inches in diameter or less. Concrete rod attachment plates shall be utilized for pipes larger than 8 inches in diameter.

#### F. Supports

1. Brackets for supporting piping from walls or columns shall be furnished with back plates where required to prevent the safe bearing capacity of the wall from being exceeded.
2. Clamps for supporting piping (sizes 3/8" to 4" only) from walls shall be malleable iron.
3. Saddle stands shall be of the adjustable type, with floor flanges for bolting to floors or foundations.
4. Where piping is installed on structural steel supports, blocking or pipe rolls shall be provided to prevent lateral pipe movement.
5. Beam and channel clamps shall be constructed of malleable iron and be Underwriters Laboratories (UL) listed and Factory Mutual (FM) approved.
6. Channel sections shall be complete with clamping nuts and fittings. Channel sections for piping supports systems shall be PS-200 Power Strut or approved equal. Finish for channel sections and fittings shall be hot dipped galvanized conforming to ASTM A153. All exposed channel ends shall be provided with end caps.
7. Concrete pier supports shall be constructed of 4000 psi concrete. 60 durometer rubber shall be installed between concrete pier supports and piping.
8. Riser clamps shall be constructed of carbon steel.

#### G. Inserts

1. Concrete inserts shall be hot dipped galvanized and shall be installed in concrete structures where required and where shown on the Contract Drawings.
2. Continuous inserts shall be PS-349 by Power-Strut or approved equal.
3. Spot inserts shall be Power Strut PS-152 or approved equal.
4. All concrete inserts shall have plastic coated filler to prevent concrete seepage.

#### H. Hanger Rods

1. Hanger rods for installation in humid environments shall be continuously threaded, Type 316 stainless steel. Hanger rods for installation in other areas shall be continuously threaded, hot dip galvanized steel unless otherwise indicated.

2. The minimum acceptable size hanger rod for each installation shall be determined from the following table:

<u>Size of Pipe (Inches)</u>	<u>Diameter of Rod (Inches)</u>
Up to 2	3/8
2-1/2 to 3-1/2	1/2
4 and 5	5/8
6 and 8	3/4
10 and 12	7/8
14 and 16	1
18 to 30	1-1/4
36 to 42	1-1/2
42 to 48	1-3/4

3. Hanger rods shall be provided with two removable nuts on each end, of like material (Type 316 stainless steel or hot dip galvanized as required), for positioning and locking rod in place.
- i. Anchor Bolts
1. Provide stainless steel anchor bolts, nuts and washers, type 316, meeting requirements of the Section entitled "Metal Fabrications" and as indicated on the Drawings. Unless otherwise indicated, size anchor bolts to the largest diameter that will pass through the bolt holes of the equipment base. Length of the bolts shall be long enough to permit a minimum of one inch of grout beneath the base plate and a minimum of three inches anchorage into the structural concrete.
  2. Provide anchor bolts, nuts and washers together with template or setting drawing sufficiently in advance to permit anchor bolts to be set either prior to or during structural concrete placement.

## **PART 3 - EXECUTION**

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### **3.1 INSTALLATION**

- A. Hang, support, and restrain mechanical work from structural work. Do not hang, support, or restrain mechanical work from electrical work, other mechanical work, stairs or walkways. Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, restraints, clamps, and attachments as required to properly support and restrain piping from building structure.
- B. Installation shall be performed as recommended by the manufacturer and shall be such that the centerline elevations of supported piping are maintained in an orderly manner.
- C. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.



#### D. Pipe Hangers and Supports

1. Horizontal metal pipe shall be supported in accordance with the following schedule, except as otherwise specified or noted on the Contract Drawings.

<u>Pipe Size</u>	<u>Maximum Support Spacing</u>
1/2 to 1-1/4 inch	6'0"
1-1/2 to 2 inch	10'0"
2-1/2 to 3 inch	10'0"
4 to 6 inch	15'0"
Over 6 inch	17'0"

2. Horizontal plastic pipe shall be supported in accordance with the following schedule, except as otherwise specified or noted on the Contract Drawings.

<u>Pipe Size</u>	<u>Maximum Support Spacing</u>
1/2 to 1-1/4 inch	4'0"
1-1/2 to 2 inch	5'0"
2-1/2 to 3 inch	6'0"
Over 4 inch	6'6"

3. Spacings do not apply where concentrated loads are placed between supports. Concentrated loads include flanges, valves and specialties.
4. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
5. Use hangers with 1-1/2 inch minimum vertical adjustment.
6. For Directional Changes: Install a hanger or support within 12" of a directional change for all pipe runs in either a horizontal or vertical plane.
7. For Concentrated Loads: Install additional hangers or supports, spaced as required and directed by the Engineer at locations where concentrated loads such as in-line pumps, valves, fittings or accessories occur, to support concentrated loads.
8. For Branch Piping Runs and Runouts over 5 feet in Length: Install a minimum of one hanger, and additional hangers if required by the hanger spacing schedules.
9. Parallel Piping Runs: Where several pipe lines run parallel in the same place and in close proximity to each other, trapeze hangers may be submitted for approval. Base hanger spacing for trapeze type hangers on the smallest size of pipe being supported. Design the entire hanger assembly based on a safety factor of five, for the ultimate strength of the material being used.
10. Vertical Piping:
  - a. Support vertical risers of piping systems by means of heavy duty hangers installed close to base of pipe risers, and by riser clamps with extension arms at intermediate floors, with the distance between clamps not to exceed 25 feet, unless otherwise specified. Support pipe risers in vertical shafts equivalent to the aforementioned. Riser piping shall be supported independently of connected horizontal piping. Install riser clamps above floor slabs, with the extension arms resting on floor slabs or pipe sleeves. Provide adequate clearances for risers that are subject to appreciable expansion and contraction caused by operating temperature ranges.
11. Hangers and supports shall be installed such that piping live and dead loads and stresses from movement do not transmit to connected equipment.

E. Inserts

1. Inserts shall be provided for suspending hanger rods and hangers from reinforced concrete slabs and sides of reinforced concrete beams.
2. Where concrete slabs form a finished ceiling, inserts shall be provided flush with slab surface.

F. Upper Hanger Attachments

1. Upper hanger attachments shall be made to structural steel wherever possible.
2. Power driven pins shall not be used.
3. Expansion nails shall not be used.
4. Powder driven fasteners shall not be used in pre-cast concrete.
5. Loads in excess of 250 pounds shall not be supported from a single welded or powder-driven stud.

G. Steel Frame Construction

1. Provide intermediate structural steel members where required.
2. Secure upper hanger attachments to steel bar joists at panel points.
3. Holes shall not be drilled in structural steel members.
4. Friction clamps shall not be used.

**3.2 PAINTING**

- A. With the exception of those parts and components customarily furnished unpainted, all metal surfaces shall be shop prepared and coated with rust-inhibitive shop paint. Shop paint shall be fully compatible with the field paint specified. Machined surfaces shall be protected against damage and corrosion by other means.
- B. Perform field painting in accordance with the Section entitled "Field Painting".

**END OF SECTION**

## SECTION 40 05 10 INTERIOR PROCESS PIPING SYSTEMS

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### PART 1 - GENERAL

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#### 1.1 SUMMARY

- A. This Section includes, but is not limited to, the following:
1. All types and sizes of piping, except those specified under other Sections or other contracts.
  2. Piping embedded in concrete within a structure or foundation will be considered as exposed and is included herein.
  3. Supports, restraints, thrust blocks and other anchors
  4. Work on or affecting existing piping
  5. Pressure and leakage testing
  6. Cleaning and disinfecting
  7. Installation of jointing and gasketing materials, specials, flexible couplings, mechanical couplings, harnessed and flanged adapters, sleeves, tie rods, and all other Work required to complete exposed piping installation.
  8. Incorporation of valves, meters and special items shown or specified into piping systems as required and as specified.

#### 1.2 REFERENCES

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:
1. American Water Works Association (AWWA)
    - a. C104/A21.4 – Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
    - b. C105/A21.5 – Polyethylene Encasement for Ductile-Iron Pipe Systems
    - c. C110/A21.10 – Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (75 mm through 1200 mm), for Water and Other Liquids
    - d. C111/A21.11 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
    - e. C115/A21.15 – Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
    - f. C116, Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile Iron and Gray Iron Fittings for Water Service.
    - g. C150/A21.50 – Thickness Design for Ductile-Iron Pipe
    - h. C151/A21.51 – Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids
    - i. C153/A21.53 – Ductile-Iron Compact Fittings, 3 In. Through 24 in. (76 mm through 610 mm) and 54 In. Through 64 In. (1400 mm through 1600 mm), for Water Service
    - j. C200 – Steel Water Pipe-6 In. (150 mm) and Larger

- k. C203 – Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot-Applied
- l. C205 – Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 In. and Larger - Shop Applied
- m. C206 – Field Welding of Steel Water Pipe
- n. C207 – Steel Pipe Flanges for Waterworks Service - Sizes 4 In. Through 144 In. (100 mm through 3,600 mm)
- o. C208 – Dimensions for Fabricated Steel Water Pipe Fittings
- p. C209 – Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines
- q. C210 – Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines
- r. C213 – Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines
- s. C214 – Tape Coating Systems for the Exterior of Steel Water Pipelines
- t. C215 – Extruded Polyolefin Coatings for the Exterior of Steel Water Pipelines
- u. C216 – Heat-Shrinkable Cross-Linked Polyolefin Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines
- v. C217 – Cold-Applied Petrolatum Tape and Petroleum Wax Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Buried Steel Water Pipelines
- w. C218 – Coating the Exterior of Aboveground Steel Water Pipelines and Fittings
- x. C219 – Bolted, Sleeve-Type Couplings for Plain-End Pipe
- y. C220 – Stainless-Steel Pipe, 4 In. (10 mm) and Larger
- z. C221 – Fabricated Steel Mechanical Slip-Type Expansion Joints
- aa. C600 – Installation of Ductile-Iron Water Mains and Their Appurtenances
- bb. C602 – Cement-Mortar Lining of Water Pipelines In Place - 4 In. and Larger
- cc. C605 – Underground Installation of Polyvinyl Chloride (PVC Pressure Pipe and Fittings for Water
- dd. C651 – Disinfecting Water Mains
- ee. C800 – Underground Service Line Valves and Fittings
- ff. C900 – Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. (100 mm through 300 mm), for Water Distribution
- gg. C901 – Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service
- hh. C905 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In. (350 mm through 1200 mm), for Water Transmission and Distribution
- ii. C906 – Polyethylene (PE) Pressure Pipe and Fittings, 4 In. Through 63 In., for Water Distribution
- jj. C907 – Polyvinyl Chloride (PVC) Pressure Fittings for Water - 4 In. Through 8 In.



(100 mm through 200 mm)

2. American National Standards Institute (ANSI)
  - a. B16.1 – Cast Iron Pipe Flanges and Flanged Fittings
  - b. B16.5 – Pipe Flanges and Flanged Fittings
  - c. B16.42 – Ductile Iron Pipe Flanges and Flanged Fittings, Classes 150 and 300
  - d. B16.47 – Large Diameter Steel Flanges, NPS 26 through NPS 60
  - e. B18.2.1 – Square and Hex Bolts and Screws Inch Series
  - f. B18.2.2 – Square and Hex Bolts (Inch Series)
3. American Society for Testing and Materials (ASTM)
  - a. A48 – Gray Iron Castings
  - b. A53 – Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
  - c. A358/358M - Electric Fusion Welded Pipe (Austenitic)
  - d. A774/774M - As-Welded Wrought Austenitic Stainless Steel Fittings for general corrosive service at low and moderate temperatures
  - e. A778 -Welded, Unannealed Austenitic Stainless Steel Tubular Products
  - f. A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
  - g. A354, Specification for Quenched and Tempered Alloy Steel Bolts, Studs and Other Externally Threaded Fasteners
  - h. ASTM A563, Specification for Carbon and Alloy Steel Nuts
  - i. B68 – Seamless Copper Tube, Bright Annealed
  - j. B88 – Seamless Copper Water Tube
  - k. B306 – Copper Drainage Tube (DWV)
  - l. D1784 – Rigid PVC Compounds and CPVC Compounds
  - m. D1785 – PVC Plastic Pipe, Schedules 40, 80 and 120
  - n. D2104 – PE Plastic Pipe, Schedule 40
  - o. D2239 – PE Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter
  - p. D2447 – PE Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter
  - q. D2464 – Threaded PVC Plastic Pipe Fittings, Schedule 80
  - r. D2466 – PVC Plastic Pipe Fittings, Schedule 40
  - s. D2467 – PVC Plastic Pipe Fittings, Schedule 80
  - t. D2683 – Socket-Type PE Fittings for Outside Diameter-Controlled PE Pipe and Tubing
  - u. D2737 – PE Plastic Tubing
  - v. D2749 – Dimensions of Plastic Pipe Fittings
  - w. D2837 – Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials
  - x. D2855 – Practice for Making Solvent-Cemented Joints with PVC Pipe and Fittings
  - y. D3035 – PE Plastic Pipe (DR-PR) Based on Controlled Outside Diameter

- z. D3222 – Specification for Unmodified PVDF Molding, Extrusion and Coating Materials
- aa. D3261 – Butt Heat Fusion PE Plastic Fittings for PE Plastic Pipe and Tubing
- bb. F714 – PE Plastic Pipe (SDR-PR) Based on Outside Diameter
- cc. F1970 – Special Engineered Fittings or Appurtenances for use in PVC or CPVC Systems
- 4. American Society of Mechanical Engineers
  - a. Section IX AWS B2.1
- 5. American Welding Society (AWS)
- 6. National Sanitation Foundation (NSF)
  - a. 61 – Drinking Water System Components - Health Effects
- 7. Recommended Standards for Water Works (Ten State Standards)

### 1.3 SUBMITTALS

- A. Shop Drawings: Submit for approval the following:
  - 1. Detailed drawings in plan and profile, and laying schedules. Provide individual drawings for each process or chemical system indicating piping, valving and appurtenances.
  - 2. Details of piping, valves, supports, accessories, specials, joints, harnessing, and connections to existing pipes and structures.
- B. Product Data:
  - 1. Manufacturer's catalog information and specifications including dimensions, sizes, pressure ratings, materials of construction and connection details.
- C. Tests: Submit description of proposed testing methods, procedures and apparatus. Submit copies of test report for each test.
- D. Certificates: Submit certificates of compliance with referenced standards.
  - 1. Manufacturer's certification that all materials furnished are in compliance with the applicable requirements of the referenced standards and this specification, including NSF Standard 61.
  - 2. Welder's Certificate to comply with paragraph 3.1.D.4.b.1 of these specifications.
- E. Record Drawings:
  - 1. Submit record drawings prior to the time of Substantial Completion.

### 1.4 QUALITY ASSURANCE

- A. Component Supply and Compatibility:
  - 1. All piping of the same material shall be supplied by a single manufacturer who shall be responsible for proper application, engineering and testing as specified herein.
  - 2. Materials shall be integrated into the overall system.
  - 3. Piping used for chemical service systems shall be fully compatible with the specified chemical for each system.



- B. CONTRACTOR shall verify all field dimensions for development and approval of Manufacturer's drawings.

## 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site to insure uninterrupted progress of the Work.
- B. Handle all pipe, fittings and accessories carefully with approved handling devices. Do not drop or roll pipe off trucks. Do not otherwise drop, roll or skid piping.
- C. Store pipes and fittings on heavy wood blocking or platforms so they are not in contact with the ground.
- D. Unload pipe, fittings and specials opposite to or as close to the place where they are to be installed as is practical to avoid unnecessary handling. Keep pipe interiors completely free from dirt and foreign matter.
- E. Inspect delivered pipe for cracked, gouged, chipped, dented or other damaged material and immediately remove from site.
- F. All pipe ends and tapped holes shall be capped or plugged for shipment. All shipping containers shall be clearly marked with order number, contents, equipment number and name.

## 1.6 WARRANTY

- A. Process piping, including all fittings, valves and appurtenances shall have a one year warranty against defects in workmanship and/or materials. Warranty period shall commence upon final acceptance or approval by the ENGINEER.

## PART 2 - PRODUCTS

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### 2.1 MATERIALS

- A. Required pipe materials are listed in the Piping Schedule. Refer to applicable Sections for material specifications.
- B. Pipe Identification Markers and Arrows: Refer to Section entitled "Mechanical Identification".
- C. Ductile Iron Pipe and Fittings:
  1. Flanged Pipe: Fabricate in accordance with ANSI/AWWA C115.
    - a. Thickness Class: As specified in piping schedule. If not otherwise specified, use Class 53.
    - b. Special Thickness Class: As specified in piping schedules.
  2. Non-Flanged Pipe: Conform to ANSI/AWWA C151 for material, pressure, dimensions, tolerances, tests, markings, and other requirements.
    - a. Pressure Class: As specified in piping schedule. If not otherwise specified, use Thickness Class 53.
  3. Joints:
    - a. Flanged Joints: Conform to ANSI/AWWA C110 and ANSI/AWWA C115 capable of meeting the pressure class or special thickness class, and test pressure specified in piping schedule.



- 1) Gaskets: Unless otherwise specified, gaskets shall be at least 1/8-inch thick, ring or full-face as required for the pipe, of a synthetic rubber compound containing not less than 50 percent by volume nitrile or neoprene, and shall be free from factice, reclaimed rubber, and other deleterious substances. Gaskets shall be suitable for the service conditions specified, specifically designed for use with ductile iron pipe and fittings.
    - a) Gasket Sealing Compounds: Provide high temperature resistant sealing compound (Loctite PST 592 or equivalent) with Dimethacrylate-ester base, and Teflon.
  - 2) Bolts: Conform to ANSI B18.2.1.
    - a) Exposed: ASTM A 307, Grade B.
    - b) Buried or Submerged: ASTM A 193, Grade B8M, Class 2, Heavy hex, Type 316 stainless steel.
  - 3) Nuts: Conform to ANSI B18.2.2.
    - a) Exposed: ASTM A 563, Grade A, Heavy hex.
    - b) Buried or Submerged: ASTM A 194, Grade B8M, Heavy hex, Type 316 stainless steel.
  4. Flanged Fittings: Conform to ANSI/AWWA C110 and ANSI/AWWA C115.
    - a. Pressure Rating: As specified above for flanged joints.
    - b. Material: Ductile iron.
    - c. Gaskets: As specified above for flanged joints.
    - d. Bolts and Nuts: As specified above for flanged joints.
  5. Cement-Mortar Lining:
    - a. Where specified in piping schedules, pipe and fittings shall be lined with a bituminous seal coated cement mortar lining in accordance with ANSI/AWWA C104.
- D. Carbon Steel Pipe and Fittings
1. Minimum yield strength of the steel shall be no less than 30,000 psi.
  2. Allowable hoop stress under scheduled test pressure shall be no greater than 50% of the specified minimum yield strength of the steel.
  3. Pipe wall thickness shall be such that the maximum deflection between pipe supports shall be no greater than 1/360 of the span.
  4. Joints for pipe, fittings, and special sections shall be as scheduled in the Payment Items and as shown on the Contract Drawings.
  5. Flanges and flange accessories shall be in accordance with AWWA C207.
    - a. Class D flanges shall be used where test pressures are less than 150 psi. Class E flanges shall be used where test pressures are 150 psi and greater.
    - b. Gaskets shall be 1/8 inch thick and shall extend from the inside diameter of the flange to at least the inside edge of the bolt circle.
    - c. The inside diameter of the flange, for pipe sizes 26 inches and larger, shall be 3/16 inch larger in diameter than the nominal outside diameter of the pipe.
    - d. Unless otherwise shown, flanges shall be oriented such that the bolt holes straddle the vertical centerline.



6. Field welded joints shall be of the lap joint, butt joint or butt-strap joint type, as per AWWA C206, and as scheduled. The CONTRACTOR shall supply a certified welding inspector whenever field welding is to be performed.
  7. Fittings shall be in accordance with AWWA C208, unless otherwise shown on the Contract Drawings.
  8. The number of pieces or segments for elbows shall be as shown on the Contract Drawings.
  9. Coatings and Linings
    - a. Coatings and linings shall be as scheduled.
    - b. All linings shall be NSF approved.
    - c. Coal tar linings shall be in accordance with AWWA C203.
    - d. Cement mortar linings shall be shop applied in accordance with AWWA C205.
    - e. Coatings and linings shall be sufficiently held back to allow the make-up of the joints specified.
    - f. Cement mortar linings at field joints shall be in accordance with Appendix A of AWWA C205.
    - g. Where necessary, mortar thickness shall be feathered or filleted to a smooth transition with adjoining sections.
- E. Stainless Steel Pipe and Fittings
1. Stainless Steel pipe shall be Type 304L, Schedule 10S austenitic stainless steel pipe. Pipe and fittings shall be electrically welded.
  2. All joints shall be gas tight. Pipe flanges shall be electrically welded stainless steel in accordance with ANSI 16.1 Class 125. Flanged ends shall be provided at all valves, instruments, equipment connections and at such joints where pipe dismantling may be required to facilitate equipment removal and maintenance.
  3. Stainless steel rolled angle face rings shall be minimum 1/8-inch thick. Rolled angle faces shall be true and perpendicular to the axis of the pipe or fittings. Plain ends of pipe or fittings shall be true and perpendicular to the axis with edges deburred.
  4. Welding of Pipe:
    - a. Welding performed under this Specification shall be completed in the shop. Field welding will not be permitted.
    - b. Stainless steel joining welds shall be made by a fully automatic, inert gas process. Before a longitudinal butt seal is welded, starting and run-off tabs shall be heliarc spot welded to each end of the pipe. Ends shall be checked for trueness to the axis. Rigid jigs and fixtures shall be used for holding parts in proper alignment while welding.
    - c. During the welding operation the joint shall be backed up from the opposite side with a chill bar. Chill bar shall have a series of holes running its entire length through which gas is introduced to assure shielding to the interior of the joint. Welding of the joint shall be by automatic arc, inert gas method. Gas shield shall be utilized top and bottom to assure that the weld is made in a completely inert atmosphere.
    - d. Filler wire shall be added to all gages of material to provide for a cross section of weld metal equal to or greater than the parent metal. Filler wire shall be at least one



grade higher than the parent metal and always of extra low carbon grade. Filler wire shall be automatically fed to the weld with the rate of travel of the automatic welding machine. Use a nonconsumable tungsten electrode, with the shielding gas being either argon or helium.

- e. Welds shall be fully penetrated, sound, and of uniform bead. Circumferential welds shall be made using the tungsten shielded arc process. Welds shall have full penetration to the interior surface of the air main. Provide gas shielding to the interior of the joint as well as to the exterior, to assure that the weld is made in a completely inert atmosphere.
  - f. All welds shall have a surface finish equal to the smoothness of a 2D sheet finish. Interior weld beads shall be smooth, evenly distributed, with an interior projection not exceeding 1/16 inch beyond the ID of the pipe or fitting. Ripples or unevenness shall be finely ground to meet the above requirements. Major grinding of the interior seams to remove excess projection of welds or severe unevenness is not permitted.
  - g. Outside weld area shall be wire brushed. Brushes shall be of stainless steel and used only on stainless steel. All exterior discoloration and deposits left by welding shall be removed mechanically with wire brushes or non-metallic abrasives.
- F. Polyvinyl Chloride (PVC) Pipe
- 1. Material: Unless otherwise shown or specified, PVC pipe shall be:
    - a. Type, Grade: Type 1, Grade 1.
    - b. Schedule: Schedule 80 conforming to ASTM D1785 and US Product Service PS 21-70 (supersedes US Commercial Standard CS 207-60) as having the same OD dimension as iron pipe.
    - c. Temperature Rating: Maximum temperature rating shall be 140 degrees F.
    - d. Color: Gray.
    - e. All pipe and fittings shall have the brand name, size, SDR or class rating, and ASTM test numbers printed on the exterior surface.
  - 2. Fittings: Type, grade, schedule, and color of fitting shall match pipe.
    - a. Solvent Weld: Solvent welded fittings shall conform to ASTM D2467 for socket type.
    - b. Threaded: Threaded fittings shall conform to ASTM D2464.
    - c. Flanged: Provide flanged fittings with Viton-A gaskets.
  - 3. Joints
    - a. Solvent: Use primer and solvent cement as recommended by PVC pipe manufacturer. Primer shall be in accordance with ASTM F656. Solvent cement shall be in accordance with ASTM D2564.
    - b. Threaded: Polytetrafluoroethylene (Teflon) (PTFE) tape required for threaded fittings. Pipe shall not be threaded.
    - c. Flanged: Provide with back-up flange of minimum 1/8-inch thickness. Back-up flanges and connecting bolts shall be of Type 304 stainless steel.

## 2.2 SPECIALTIES

### A. Wall Castings and Sleeves

1. Wall castings shall be cast or ductile iron and shall be of the configuration as shown on the Contract Drawings.
2. Sleeves shall be solid cast or ductile iron castings or fabricated from Schedule 40 steel pipe.
3. Fabricated wall pipes and sleeves of ductile or cast iron pipe may be used in lieu of wall castings and cast sleeves with prior acceptance of the ENGINEER.
  - a. Fabrication shall be by a manufacturer regularly engaged in the field.
4. Wall castings and sleeves shall be provided with waterstops when installed in poured concrete foundations, walls, slabs, and elsewhere as shown.
  - a. Waterstops for fabricated sleeves shall be at least the same thickness as the sleeve and a minimum of 2 inches in width.
    - 1) Attached by continuous fillet weld both sides around the sleeve.
      - a) MIG weld shall be used on cast or ductile iron.
      - b) One waterstop for lengths up to and including 12 inches.
      - c) Two waterstops for lengths over 12 inches.
5. Waterstops for castings shall be the manufacturer's standard.

### B. Link Seals

1. Provide link type mechanical seals suitable for working pressure, as scheduled, corrosive service and accessible from one side, with glass reinforced nylon pressure plates and stainless steel bolts and nuts.
2. Product and Manufacturer: Link-Seal, as manufactured by Thunderline Corporation, or equal.

### C. Bolted Sleeve Type Couplings

1. Pressure and Service: Same as connecting piping.
2. Sleeve and Follower: Carbon steel with fusion bonded epoxy coating, for exposed service.
3. Gaskets: Nitrile (Buna N) rubber.
4. Bolts and Nuts: Stainless steel, Type 304.
5. Product and Manufacturer: Style 38 by Dresser Industries, Type 411 by Smith-Blair, or equal.

### D. Flanged Coupling Adapters

1. One end of adapter shall be flanged and other end shall have a bolted sleeve type coupling.
2. Pressure and Service: Same as connecting piping.
3. Body and Follower: Cast or ductile iron, with fusion bonded epoxy coating.
4. Gaskets: Nitrile (Buna N) rubber.
5. Bolts and Nuts: Stainless steel, Type 304.

6. Product and Manufacturer: Style 127 by Dresser Industries, Type 912 by Smith-Blair, or equal.
- E. Tapped Connections
1. Provide taps where shown or required for small-diameter pipe connections.
  2. Provide corporation stops where shown or required.
  3. Corporation stops shall be threaded to conform to AWWA C800 with standard corporation stop thread at the inlet. Outlet shall be fitted with coupling nut for flared tube service unless otherwise specified.
    - a. Corporation stops shall be manufactured by:
      - 1) Ford
      - 2) Hays
      - 3) Mueller
      - 4) Or equal
  4. Where pipe wall thickness or tap diameter is inadequate to provide required minimum number of threads, provide a tapping saddle.
  5. For flanged connections on tapping saddle outlet branch, counterbore flange per MSS SP-60 dimensions. Inside diameter of the outlet shall be 1/4-inch greater than nominal diameter.

### **PART 3 - EXECUTION**

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#### **3.1 INSTALLATION**

- A. General:
1. Install piping as shown, specified and as recommended by the manufacturer.
  2. If there is a conflict between manufacturer's recommendations and the Contract Drawings or Specifications request instructions from ENGINEER before proceeding.
- B. Piping Installation:
1. Install straight runs true to line and elevation.
  2. Install vertical pipe truly plumb in all directions.
  3. Install piping parallel or perpendicular to building walls. Piping at angles and 45 degree runs across corners will not be accepted unless specifically shown or approved.
  4. Install small diameter piping generally as shown when specific locations and elevations are not indicated. Locate such piping as required to avoid ducts, equipment, beams, and other obstructions.
  5. Install piping so as to leave all corridors, walkways, work areas, and like spaces unobstructed. Unless otherwise approved, provide a minimum headroom clearance under all piping of 7 feet 6 inches.
  6. Protect and keep clean water pipe interiors, fittings and valves.
  7. Provide temporary caps or plugs over all pipe openings at the end of each days work, and when otherwise required or directed by ENGINEER.
  8. Cutting: Cut pipe from measurements taken at site, not from Contract Drawings.

9. Install dielectric unions wherever dissimilar metals are connected except for bronze or brass valves in ferrous piping.
10. Provide a union downstream of each valve with screwed connections.
11. Provide screwed or flanged unions at each piece of equipment, where shown, and where necessary to install or dismantle piping.
12. Provide all necessary adapters, specials and connection pieces required when connecting different types and sizes of pipe or connecting pipe made by different manufacturers.

C. Joints:

1. General:

- a. Make joints in accordance with the pipe manufacturer's recommendations and the requirements below.
- b. Cut piping accurately and squarely and install without forcing or springing.
- c. Ream out all pipes and tubing to full inside diameter after cutting. Remove all sharp edges on end cuts.
- d. Remove all cuttings and foreign matter from the inside of pipe and tubing before installation. Thoroughly clean all pipe, fittings, valves, specials, and accessories before installing.

2. Flanged Joints:

- a. Assemble flanged joints using 1/8-inch ring-type gaskets for raised face flanges. Use full face gaskets for flat face flanges unless otherwise approved by ENGINEER. Gaskets shall be suitable for the service intended in accordance with the manufacturer's ratings and instructions. Gaskets shall be properly centered.
- b. Bolts shall be tightened in a sequence which will insure equal distribution of bolt loads.
- c. The length of bolts shall be uniform, and they shall not project beyond the nut more than 1/4-inch or fall short of the nut when fully taken up. The ends of bolts shall be machine cut so as to be neatly rounded. No washers shall be used.
- d. Bolt threads and gasket faces for flanged joints shall be lubricated prior to assembly.
- e. Alternately tighten bolts 180 degrees apart to compress the gasket evenly.

3. Steel Pipe Joints:

- a. Joints in steel pipe shall be butt welded, flanged, or threaded joints, except that flexible couplings, mechanical couplings, or flanged connections shall be provided where shown.
- b. Welding shall conform to the requirements of AWWA C206. Pipe 36 inches in diameter and larger shall be welded both inside and outside of the pipe.
  - 1) CONTRACTOR shall submit documentation that all welders have been qualified in accordance with ASME Boiler and Pressure Vessel Code Section IX or American Welding Society Structural Welding Code D1.1, Section 5, whichever is required. CONTRACTOR shall submit current certificates for the Project Representative's review.
- c. After welding, the joint and the surrounding damaged or uncoated area shall be coated with the same material and to the same thickness as the shop applied

coating.

d. Additional Welding Requirements:

- 1) On pipe lines specified to be welded, all joints between sections of pipe and between pipe and fittings 2-inches and larger shall be electric arc welded, and all joints on pipe 1-1/2 inches and smaller shall be gas welded. CONTRACTOR shall be entirely responsible for the quality of the welding. CONTRACTOR shall:
  - a) Conduct tests not only of the welding procedure used by his organization to insure welds that will meet the required tests, but also of the welding operators to determine the ability of the operators to make sound welds under standard conditions.
  - b) Be thoroughly familiar with ANSI B31.1, and American Welding Society Standard B3.0.
  - c) Be capable of performing all welding operations required for construction and installation of the piping systems.
- 2) Qualification of Welders: Rules of procedure for qualification of all welders and general requirements for fusion welding shall conform with the applicable portions of ANSI B31.1 and American Welding Society Standard B3.0, and also as outlined below.
- 3) Examining Welder: Each welder shall be examined at the job site by the CONTRACTOR in the presence of the ENGINEER to determine the ability of the welder to meet the qualifications required. Welders for piping shall be tested for all positions, including welds with the axis horizontal (not rolled) and with the axis vertical. Each welder shall be:
  - a) Allowed to weld only in the position in which the welder is qualified.
  - b) Required to identify the weld with the specific code marking signifying the name and number assigned.
- 4) Examination Results: ENGINEER shall be provided with a listing of names and corresponding code markings. Where a welder fails to meet the prescribed welding qualifications, that welder shall be retested and, if the welder fails the second test, the welder shall be disqualified for work on the project.

D. Installing Valves and Accessories:

1. Provide supports for large valves, flow meters and other heavy items as shown or required.
2. Install floor stands as shown and as recommended by the manufacturer.
3. Provide lateral restraints for extension bonnets and extension stems as shown and as recommended by the manufacturer.
4. Provide steel sleeves where operating stems pass through floor. Extend sleeves 2 inches above floor.
5. Position valve operators as shown. When the position is not shown, install the valve so that it can be conveniently operated and as approved by ENGINEER. Avoid placing operators at angles to the floors or walls, or where shaft is in a vertical position.
6. Position flow measuring devices in pipe lines so that they have the amount of straight

upstream and downstream runs recommended by the manufacturer, unless specific location dimensions are shown. Position swing check valves so that they do not conflict with the discs of butterfly valves.

- E. Unions:
  1. Install dielectric unions wherever dissimilar metals are connected except for bronze or brass valves in ferrous piping.
  2. Provide a union downstream of each valve with screwed connections.
  3. Provide screwed or flanged unions at each piece of equipment, where shown, and where necessary to install or dismantle piping.
- F. Eccentric Reducers: Use eccentric reducers where shown and where air or water pockets would otherwise occur in mains because of a reduction in pipe size.
- G. Transitions from One Type of Pipe to Another:
  1. Provide all necessary adapters, specials and connection pieces required when connecting different types and sizes of pipe or connecting pipe made by different manufacturers.

### 3.2 THRUST RESTRAINT

- A. Provide thrust restraint on all pressure piping systems and where otherwise shown or specified.
- B. Thrust restraint may be accomplished by means of restrained pipe joints. Thrust restraints shall be designed for the axial thrust exerted by the test pressure specified in the "Piping Schedule".
- C. Restrained Pipe Joints:
  1. Pipe joints shall be restrained by means suitable for the type of pipe being installed.
    - a. Restrain ductile iron pipe connected by flexible couplings or flanged coupling adapters by harnessing across the coupling or adapter using tie rods or extended bolts connecting between flanges.
    - b. Steel pipe shall have butt-welded joints, flanged joints, or flexible or mechanical coupling connectors. Provide tie rods connected to ears welded to the steel pipe for restraint at all flexible coupling connectors.

### 3.3 PAINTING

- A. Painting shall be in accordance with the section entitled "Field Painting".

### 3.4 TESTING OF PIPING

- A. General:
  1. Test all piping as specified below unless otherwise authorized by ENGINEER.
  2. Notify ENGINEER 48 hours in advance of testing.
  3. Provide all testing apparatus including pumps, hoses, gages, and fittings.
  4. Pipelines shall hold the specified test pressure for two hours.
  5. Repair and retest pipelines which fail to hold specified test pressures or which exceed the allowable leakage rate.

6. Test pressures required are at the lowest elevation of the pipeline section being tested, unless otherwise specified.
  7. Follow special test procedures below for gaseous chemical and liquid chlorine lines.
  8. Conduct all tests in the presence of the ENGINEER. Repeat tests in the presence of local authorities having jurisdiction, if required.
- B. Schedule of Pipeline Tests:
1. Test piping at the test pressure listed in the Piping Schedule.
  2. For piping not included in the Schedule, the ENGINEER will notify CONTRACTOR in writing of the test pressure to be utilized.
- C. Pressure Test Procedure:
1. Insure that all supports and restraint protection are securely in place.
  2. Fill section to be tested slowly with water and expel all air. Install cocks, if necessary, to ensure removal of air.
  3. Test only one section of pipe at a time.
  4. Apply specified test pressure required for two hours and observe pressure gage. Check carefully for leaks while test pressure is being maintained.
- D. Leakage Testing:
1. Conduct leakage test after satisfactory completion of pressure test.
  2. Allow concrete pipe to stand full of water at least 12 hours prior to starting leakage test.
  3. Allowable Leakage Rates (gallons per hour per 1000 feet per inch diameter:
    - a. Copper, Steel, Ductile Iron, Thermo Plastic, and all Other Piping: 0.0.
  4. Leakage Test Procedure:
    - a. Examine exposed pipe, joints, fittings and valves. Repair visible leakage or replace the defective pipe, fitting or valve.
    - b. Refill the line under test to reach the required test pressure.
    - c. Provide a test container filled with a known quantity of water at the start of the test. Attach the test pump suction to the test container.
    - d. Pump water from the test container into the line with the test pump to hold the specified test pressure for the test period. Water remaining in the container shall be measured and the amount used during the test shall be recorded on the test report.
    - e. Perform all repair, replacement, and retesting required because of failure to meet testing requirements.
    - f. Leakage shall be less than rate specified above.

### 3.5 CLEANING AND DISINFECTION

- A. Cleaning:
1. Thoroughly clean all piping and flush prior to placing in service in a manner approved by ENGINEER.
  2. Piping 24 inches in diameter and larger shall be inspected from inside and all debris, dirt and foreign matter removed.
  3. If piping which requires disinfection has not been kept clean during storage or





installation, CONTRACTOR shall swab each section individually with a five percent hypochlorite solution, to ensure clean piping.

**B. Disinfection:**

1. Disinfect all potable and finished water piping.
2. A suggested procedure for accomplishing disinfection is specified below. Other procedures will be considered for approval by the ENGINEER.
  - a. Thoroughly flush piping prior to disinfection with water. For pipelines 24 inches in diameter and larger, pipelines shall be manually cleaned, carefully removing all sweeping, dirt and debris prior to disinfection.
  - b. Conform to procedures described in AWWA C651. Continuous feed method of disinfecting shall be used unless alternative methods is acceptable to ENGINEER.
3. Water for initial flushing, testing and chlorination will be furnished by OWNER. CONTRACTOR shall provide all temporary piping, hose, valves, appurtenances and services required. Cost of water required for re-disinfection will be paid by CONTRACTOR to OWNER at OWNER's standard rates.
4. Chlorine will be supplied by CONTRACTOR.
5. Bacteriologic tests will be performed by OWNER. A certified laboratory report will be available to CONTRACTOR, if requested.
6. Chlorine concentration in the water entering the piping shall be between 50 and 100 parts per million, such that a minimum residual concentration of 25 mg/l will be left after a 24-hour retention period. Care shall be taken to insure disinfection of the piping in all its parts. The operation shall be repeated as necessary to provide complete disinfection.
7. After the required retention period, the heavily chlorinated water shall be flushed to drain, unless otherwise directed.

**3.6 IDENTIFICATION OF PIPING**

- A. Pipe Identification Markers and Arrows: Refer to Section entitled "Mechanical Identification".

3.7 PIPING SCHEDULE

Service ID	Description	Size	Mat'l	Wall Thickness or Class	Joints	Interior Lining	Exterior Coating	Insulation	Test Pressure (psig)	Chlorination
W	Potable Water	6	DI	Class 53	Flg.	C. Mort.	Pt.	N	150	Y
		3								
SL	Sludge	12	SS	Sch. 10	Wld.	---	---	N	150	N
		3								
KMnO <sub>4</sub>	Potassium Permanganate	3	PVC	Sch. 80	Solv. Wld	---	---	---	100	N
		2								
		1								
H <sub>2</sub> SiF <sub>6</sub>	Hydrofluosilicic Acid (Fluoride)	4	PVC	Sch. 80	Solv. Wld	---	---	---	100	N
		3								
		2								
		1-1/2								
		1/2								
PRD	Coagulation Basin Drain	20	DI	Class 53	Flg./PE	C. Mort.	Pt.	N	150	Y
		1								
PW	Plant Water	1	DI	Class 53	Flg.	C. Mort.	Pt.	N	150	N
		3								
		4								
PW	Plant Water	3/4	SS	Sch. 10	Wld.	---	---	Y	150	N
		6								
CA	Compressed Air	3/4	SS	Sch. 10	Wld.	---	---	Y	15	N
		1/2								
D/W	Drain/Waste	1/2	SS	Sch 10	Wld.	---	---	Y	15	N

Legend

- CS Carbon steel
- C. Mort. Cement mortar incl. bituminous seal coat
- DI Ductile iron
- Epoxy Liquid per AWWA Standard C210
- Flg. Flanged
- Pt. Paint
- PE Plain end
- PVC Polyvinyl chloride
- Solv. Wld Solvent welded
- Wld. Welded



**SECTION 40 05 53**  
**PROCESS VALVES THREE INCHES AND LARGER**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. This Section includes the following process valves as shown on the Contract Drawings, complete with accessories:
1. Ball valves
  2. Butterfly valves
  3. Plug valves
  4. Pressure Relief Valve
- B. Certain features of the process valves shall be as scheduled.

**1.2 REFERENCES**

- A. Comply with the latest revision of the following codes, standards and specifications, except where more stringent requirements have been specified herein:
1. American National Standards Institute (ANSI)
  2. American Society for Testing and Materials (ASTM)
    - a. ASTM A126 Standard Specification for Gray Iron Castings for Valves
    - b. ASTM A536 Standard Specification for Ductile Iron Castings
  3. American Society of Mechanical Engineers
    - a. ASME / AWWA B16.1. Cast Iron Pipe Flanges and Flanged Fittings
  4. American Water Works Association (AWWA)
    - a. C504 - Rubber Seated Butterfly Valves
    - b. C507 - Ball Valves, 6 in. through 48 in.
    - c. C550 - Protective Interior Coatings for Valves and Hydrants
  5. National Sanitation Foundation (NSF)
    - a. 61 - Drinking Water System Components

**1.3 SUBMITTALS**

- A. Submit the following in accordance with the General Conditions:
1. Product Data: Manufacturer's data and spec sheets marked to specifically indicate the equipment and materials proposed for this project. Indicate selections with arrows, and cross out irrelevant data.
  2. Manufacturer's certification that all materials furnished are in compliance with the applicable requirements of the referenced standards and this specification.
  3. Certified results of performance, leakage, hydrostatic and proof-of-design tests.
  4. Operation and Maintenance Data
  5. Manufacturer's Certificate of Proper Installation

## 1.4 QUALITY ASSURANCE

- A. Qualifications
  - 1. Valve manufacturer shall have at least five years of experience in the manufacturing of the specified type of valve.
- B. Component Supply and Capability
  - 1. Valves of like size, type and material shall be supplied by a single manufacturer who shall be responsible for the proper application, engineering, testing and operation of the valve as specified herein.
  - 2. All components of like size and type shall be the product of the same manufacturer for purposes of parts interchangeability.

## 1.5 DELIVERY, STORAGE AND HANDLING

- A. Delivery of material including unloading, storage and handling of valves shall be in accordance with the manufacturer's recommendations.
- B. Materials shall be elevated above the ground and stored to avoid corrosion and deterioration.
- C. Deliver and store valves, 16 inch and larger, in shipping containers with labeling in place. All shipping containers shall be clearly labeled.

## 1.6 WARRANTY

- A. Valves shall have a two year warranty against defects in workmanship and/or materials. Warranty period shall commence upon final acceptance and approval by ENGINEER.

## PART 2 - PRODUCTS

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### 2.1 MANUFACTURERS

- A. The manufacturers named in this Section establish a standard of quality necessary for the Project.

### 2.2 GENERAL

- A. Valves to include operator, actuator, hand wheel, extension stem, stem guides, floor stand, operating nut, wrench, and accessories to allow a complete operation from the intended operating level.
- B. Valve to be suitable for intended service. Renewable parts not to be of a lower quality than specified.
- C. Valve same size as adjoining pipe, unless otherwise called out on Drawings or in the Schedule.
- D. Valve ends to suit adjacent piping.
- E. Resilient seated valves shall have no leakage (drip-tight) in either direction at valve rated design pressure. All other valves shall have no leakage (drip-tight) in either direction at valve rated design pressure, unless otherwise allowed for in this section or in stated valve standard.
- F. Size operators and actuators to operate valve for the full range of pressures and velocities.
- G. Valve to open by turning counterclockwise.
- H. Factory mount operator, actuator, and accessories.



- I. Each valve shall have the name of the manufacturer and the size of the valve cast on the body or bonnet in raised letters.
- J. Unless otherwise specified, the interior surfaces of metal valves in contact during the seating operation shall be either solid bronze or faced with bronze.

## 2.3 MATERIALS AND CONSTRUCTION

### A. Ball Valve

1. The following manufacturers are named to establish a standard of quality necessary for the Project:
  - a. Henry Pratt Company
  - b. GA Industries, Inc.
  - c. Or approved equal.
2. Body
  - a. Valve body shall be constructed of ductile iron ASTM A536 and shall be full port design with an inlet and outlet flanged waterway equal to the required valve size.
  - b. Flanges shall be flat faced and drilled to the applicable ANSI B16.1 Standard Class 125. Valve body shall have both a drain and vent hole drilled and tapped.
  - c. The body shall have bronze bearings which assist in placing the ball in the central position.
  - d. The body seat shall be Monel, be electronically fused to the base metal, and shall not protrude into the waterway.
3. Ball
  - a. The ball shall be ductile iron ASTM A536.
  - b. The ball seat shall be Type 304 stainless steel. The valve will use an offset metal-to-metal seating that allows the seats to only be in contact at the actual point of closing.
  - c. The seat shall be connected to the ball by means of a stainless steel mounting ring that is securely attached and pinned into position after the correct setting has been obtained. Seats threaded directly on to the ball will not be acceptable.
  - d. Valve seat assembly shall be fully adjustable and replaceable in the field without removing the valve from the line.
4. Valve shaft shall be stainless steel, ASTM A564 Type 17-4-PH.
5. Ball valves scheduled for chemical service, with the exception of sodium hypochlorite, shall be PVC, full port, true-union type with Teflon seats. Seal material shall be compatible with the chemical being conveyed. Ball valves shall be Hayward, Asahi-America or approved equal.

### B. Butterfly Valves

1. The following manufacturers are named to establish a standard of quality necessary for the Project:
  - a. Henry Pratt Company, Triton XR-70
  - b. DeZURIK Water Controls, BAW Series
  - c. Or approved equal.
2. Valve bodies shall be cast iron or ductile iron of the AWWA short body design. Pressure class, velocity class and end type shall be as scheduled. Flanged end valves shall meet ANSI B16.1, Class 125 or Class 250, as scheduled.

3. Valve seats shall be Buna-N, EPDM or Viton. Seats shall be bonded and vulcanized within a recessed cavity within the valve body or mechanically retained within a dovetail groove in the valve body by means of epoxy injected under pressure behind the seat. Bonded and vulcanized seats shall withstand a 75-pound test pull in accordance with ASTM D429, Method D. Disc mounted valve seats will not be accepted.
  4. Valve shafts shall be type 304 or type 316 stainless steel.
  5. Valve discs shall be cast iron (ASTM A126 Class B or ASTM C48) or ductile iron (ASTM A536) with type 316 stainless steel seating edge.
  6. Shaft bearings shall be non-metallic, Teflon lined, fiberglass backed and self lubricating.
  7. Valve packing shall be self-compensating split-vee chevron type.
  8. Butterfly valves shall be constructed for installation with shafts in a horizontal position.
  9. Valves shall be designed such that no leakage occurs at the shutoff pressure, which shall be the test pressure specified or scheduled for the respective pipeline.
  10. Butterfly valves scheduled for chemical service application shall be constructed of PVC with no metal components in contact with the chemical. The butterfly valves shall be rated for 150 psi, equipped with a full body liner seal and stainless steel shaft. Butterfly valves for below ground installation shall be provided with a handwheel operated valve stem extension.
- C. Plug Valves
1. The following manufacturers are named to establish a standard of quality necessary for the Project:
    - a. DeZurik
    - b. Henry Pratt Co.
    - c. Or approved equal.
  2. General
    - a. Plug valves shall be of the non-lubricated eccentric type with resilient faced plugs.
    - b. Valve pressure ratings shall be 150 psig minimum.
    - c. Each valve shall have an indicator showing the plug position and the direction of normal flow.
  3. Materials of Construction
    - a. Valve bodies shall be ASTM A126 Class B cast iron. Valves seats shall be 90% pure nickel, or stainless steel, with a minimum thickness of 1/8 inch. Seat area shall be raised.
    - b. Plugs shall be of ASTM A126 Class B cast iron with a cylindrical seating surface eccentrically offset from the center of the plug shaft. The plug shall be resiliently faced with a synthetic rubber, suitable for use with alum sludge. The interference between the plug and the seat, with the plug in the closed position, shall be externally adjustable in the field with the line under pressure.
    - c. End connections shall be as scheduled.
    - d. Valve shaft seals shall be externally adjustable multiple vee-ring type and shall be re-packable without removing the bonnet or actuator from the valve under pressure.
    - e. Shaft bearings shall be of the permanently lubricated, stainless steel sleeve type.
    - f. All manual valves shall have gear actuators with tee wrenches or handwheels, as



scheduled. Valves installed 5 feet above the floor shall have chain-wheels.

- g. Manual valves shall have extension stems, floorstands, floor boxes, valve boxes or extended bonnets as shown on the Contract Drawings or as scheduled.

#### D. In-line Check Valves

1. In-line check valves shall be constructed of 100% elastomer, have an unibody design, and be provided with Type 316 Stainless Steel expansion clamps.
2. In-line check valves shall be installed within the pipe ID and shall not extend beyond the end of the pipe.
3. In-line check valves shall operate on differential pressure and include no moving mechanical parts. The valve shall allow passage of flow in one direction and prevent reverse flow in the opposite direction.
4. In-line check valves shall be manufactured by TideFlex Technologies or approved equal.

#### E. Pressure Relief Valves

1. Pressure relief valves shall be constructed of PVC and shall be field-adjustable from 0-150 psi without requiring removal from the piping.
2. Diaphragm material for applications shall be compatible with the liquid being pumped.
3. Valve size shall be as shown on the Contract Drawings.

#### F. Manual Actuators

1. Manual actuators shall be fully compatible with the valve supplied and shall be furnished by the valve manufacturer.
2. Manual actuators shall be of the traveling nut, self-locking style, and shall be capable of withstanding 450 foot-pounds of input torque at the extreme operator positions. The traveling nut operators shall exhibit characteristic closure at extreme open/close positions to minimize water hammer.
3. Construction and Operation
  - a. Manual actuators for other than buried service shall have a position indicator to indicate valve position for all points between fully opened and fully closed.
  - b. All valves located 5 feet or more from the floor shall be equipped with chain wheel actuators.
  - c. Handwheels shall be 12 inches diameter minimum for valves 14 inches and larger and shall be 8 inches in diameter for valves less than 14 inches.
  - d. Manual actuators shall be designed to operate the valve with a full hydraulic imbalance as scheduled, and with a maximum 80 pounds of effort with both hands.

#### G. Electric Actuators

1. Electric actuators, where scheduled, shall be in accordance with the Section entitled "Electric Valve Actuators."

## 2.4 SOURCE QUALITY CONTROL

### A. Factory Test

1. Provide Certified Hydrostatic Test and Production Reports documenting compliance with applicable standards.

## 2.5 SHOP FINISHES

- A. With the exception of those parts and components customarily furnished unpainted,



prepare and coat all metal surfaces with rust inhibitive shop paint. Shop paint shall be fully compatible with the field paint specified.

- B. Protect machined surfaces against damage and corrosion by other means.
- C. Valve interior coating shall be in accordance with AWWA C550.

## **PART 3 - EXECUTION**

---

### **3.1 INSTALLATION**

- A. Install valves and actuators in accordance with the configuration shown on the Contract Drawings, prior to testing and chlorination of the pipeline in which valves are installed.
- B. Support valves independently from the pipeline on supports acceptable to the ENGINEER.

### **3.2 FIELD QUALITY CONTROL**

- A. Conduct operating tests to adequately show that the equipment has been properly installed and will function as specified. All tests shall be subject to the ENGINEER's review.
- B. The pipelines in which valves are installed shall be filled with water and pressurized to the test pressure to demonstrate that the installed valves do not leak.
- C. Correct any deficiencies in the valves or the installation.

### **3.3 PAINTING**

- A. Perform field painting in accordance with the Section "Field Painting"



## 3.4 SCHEDULE

Service Area	Description	Type	Size (in)	Ends	Min Class	Actuator
Chlorine Booster Pump System	Potable Water Isolation Valve	BV	3	Fig	200	Manual
	Plant Water Isolation Valve	BV	3	Fig	200	Manual
	Pressure Reducing Valve	PRV	3	Fig	200	N/A
Potassium Permanganate	Drain Valve No. 1	BV	3	Fig	150	Manual
	Drain Valve No. 2	BV	3	Fig	150	Manual
Fluoride	Fill Valve No. 1	BV	3	Fig	150	Manual
	Fill Valve No. 2	BV	3	Fig	150	Manual
	In-line Check Valve No. 1 (Sturgeon Point)	CV	4	Fig.	150	Manual
	In-line Check Valve No. 2 (Sturgeon Point)	CV	4	Fig.	150	Manual
	In-line Check Valve No. 3 (Van de Water)	CV	4	Fig.	150	Manual
	Remote Spill Container Valve	BV	3	Fig.	150	Manual
Coagulation Basin No. 1	Drain Valve	BFV - Sub	20	Fig	150B	FS - O/C
	Sludge Draw-off Valve	PLV - Sub	8	Fig	150	Existing
Coagulation Basin No. 2	Drain Valve	BFV - Sub	20	Fig	150B	FS - O/C
	Sludge Draw-off Valve	PLV - Sub	8	Fig	150	Existing
Coagulation Basin No. 3	Drain Valve	BFV - Sub	20	Fig	150B	FS - O/C
	Sludge Draw-off Valve	PLV - Sub	8	Fig	150	Existing
Coagulation Basin No. 4	Drain Valve	BFV - Sub	20	Fig	150B	FS - O/C
	Sludge Draw-off Valve	PLV - Sub	8	Fig	150	Existing
Coagulation Basin No. 5	Drain Valve	BFV - Sub	20	Fig	150B	FS - O/C
	Sludge Draw-off Valve	PLV - Sub	8	Fig	150	Existing



Legend

BV	Ball Valve	BFV	Butterfly valve	FS	Floor Stand
PLV	Plug Valve	Sub	Submerged Service	Elec.	Electric
Flg	Flanged	O/C	Open/close service	Mod.	Modulating service

**END OF SECTION**

**SECTION 40 05 56**  
**MISCELLANEOUS VALVES AND TRAPS**

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**PART 1 - GENERAL**

---

**1.1 SUMMARY**

- A. This Section includes valves 2-1/2 inches and smaller to be installed in pressure pipelines, including tapping and installing of corporation stops and valves on existing or newly installed pipes complete with connections and accessories, as shown on the Contract Drawings.
- B. Providing special valves and traps not specified elsewhere.

**1.2 REFERENCES**

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:
  - 1. American National Standards Institute (ANSI)
  - 2. American Society for Testing and Materials (ASTM)
  - 3. American Society of Mechanical Engineers (ASME)
  - 4. American Water Works Association (AWWA)
  - 5. National Sanitation Foundation (NSF)

**1.3 SUBMITTALS**

- A. Submit the following in accordance with the applicable sections of the General Conditions:
  - 1. Catalog cut sheets and specifications including: dimensions, materials of construction, sizes, and mounting details.
  - 2. Detail drawings for each size corporation stop.
  - 3. Manufacturer's certification that all materials furnished are in compliance with the applicable requirements of the referenced standards and this specification.

**1.4 QUALITY ASSURANCE**

- A. Component Supply and Compatibility
  - 1. Valves of like size, type and material shall be supplied by a single manufacturer who shall be responsible for the proper application, engineering, testing and operation of the valve as specified herein.
  - 2. All components of like size and type shall be the product of the same manufacturer for purposes of parts interchangeability.

**1.5 DELIVERY, STORAGE AND HANDLING**

- A. Delivery of material including unloading, storage and handling of valves shall be in accordance with the manufacturer's recommendations.
- B. Materials shall be elevated above the ground and stored to avoid corrosion and deterioration.

- C. Shipping containers shall be clearly labeled.

## 1.6 WARRANTY

- A. Valves shall have a one year warranty against defects in workmanship and/or materials. Warranty period shall commence upon final acceptance and approval by ENGINEER.

## PART 2 - PRODUCTS

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### 2.1 MANUFACTURERS

- A. The manufacturers named in this Section establish a standard of quality necessary for the Project.

### 2.2 GENERAL

- A. Unless otherwise specified, manually operated valves shall open by turning counterclockwise.
- B. Unless otherwise specified, valves shall be designed for 150 psi working pressure.
- C. Valves and traps shall have flanged, threaded, or soldered joints, as required for the type of pipe in which they are installed.
- D. Valve size shall be consistent with the adjoining pipe size, unless otherwise called out on the Contract Drawings.
- E. Valves shall include operator, actuator, hand wheel, extension stem, stem guides, operating nut, wrench, and accessories as shown, specified or required to allow complete operation from the intended operating level. Size the operators and actuators to operate valve for the full range of pressures and velocities anticipated in the pipeline.
- F. Each valve shall have the name of the manufacturer and the size of the valve cast on the body or bonnet in raised letters.
- G. All valves and traps of like type furnished under one contract shall be the product of one manufacturer.
- H. Unless otherwise specified, the interior surfaces of metal valves in contact during the seating operation shall be either solid bronze or faced with bronze.
- I. For all valves with solvent welded connections, the CONTRACTOR shall ensure the compatibility of the solvent cement with the specific chemical or liquid being conveyed. For sodium hypochlorite, CONTRACTOR shall use IPS Weld-on 724 solvent cement and IPS Weld-on P-70 primer.

### 2.3 MATERIALS AND CONSTRUCTION

- A. Ball Valves
  1. Ball valves for water service shall be bronze body, Teflon seats and seals, solder or threaded ends, plastic-covered steel handle.
  2. Ball valves for chemical service shall be PVC, full port, true-union type with Teflon seats. Seal material shall be compatible with the chemical being conveyed. Ball valves shall be Hayward, Asahi-America or approved equal.
  3. Ball valve models shall be identifiable by the color designation on the valve handle.
  4. Valve shall be provided with a label identifying the direction of liquid flow.
  5. Spring return handles and electric actuators shall be provided at locations indicated on

the Contract Drawings. Spring return handles and electric actuators shall be manufactured by Hayward.

B. Check Valves

1. Swing-Type Check Valves

- a. PVC check valves for chemical service shall be swing type, suitable for either horizontal or vertical installation, with Teflon seats. Seal material shall be compatible with the chemical being conveyed. PVC check valves shall be manufactured by Asahi-America or approved equal.

C. Back-Pressure Valve

1. Backpressure valves for the chemical service shall be constructed of PVC and shall be field adjustable from 0-150 psi without requiring removal from the piping.
2. Diaphragm material for chemical applications shall be compatible with the chemical being pumped.
3. Valve size shall be as shown on the Contract Drawings.

D. Corporation Stops

1. Corporation stops shall be threaded to conform to AWWA C800 with standard corporation stop thread at the inlet. The outlet shall be fitted with coupling nut for flared tube service unless otherwise specified.
2. For chemical service applications, the ball valve and solution tube assembly shall be constructed of PVC. For water service applications, ball valve shall be constructed of brass and the solution tube assembly shall be constructed of PVC.
3. Each corporation stop shall be provided with a safety chain to prevent rapid removal of the diffuser during the disassembly process.
4. Corporation stops shall be manufactured by:
  - a. Ford
  - b. Hays
  - c. Mueller
  - d. Or equal

E. Strainers

1. Strainers for instrument sample lines shall have a plastic body, with 60 mesh Type 304 stainless steel screen and threaded ends. Strainers shall be manufactured by Flow EZY Filters, Inc. or equal.
2. Strainers for chemical service shall be true-union type, transparent PVC body, with 40 mesh PVC screen. Strainers 2" and smaller shall be rated for 150 psi. Seal material shall be compatible with the chemical being conveyed. Filter maintenance shall be achieved without removing the strainer from the pipeline. PVC wye strainers shall be Chemline Plastics Limited, Asahi-America or approved equal.

F. Quick Disconnect Fittings

1. Quick disconnects shall be polypropylene female couplers by female NPT with lockable polypropylene dust covers. Gasket material shall be compatible with the liquid being conveyed. Size shall be as indicated on the Contract Drawings. Material shall be black and UV resistant.
2. Labeling of quick connect fittings shall include, but not be limited to, the title "Chemical Transfer Station" and the name, concentration and specific gravity of each chemical.



3. CONTRACTOR shall provide one set of spare quick connect fittings for each chemical.
- G. Hose Connection Coupler/Adapter
  1. Hose pipe connection couplers/adapters shall be threaded PVC female couplers by female NPT.
  2. Size shall be as indicated on the Contract Drawings.
- H. Eductor
  1. To be inserted prior to final submittal.

### **PART 3 - EXECUTION**

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#### **3.1 INSTALLATION**

- A. Install miscellaneous valves and traps in accordance with the configuration shown on the Contract Drawings.

#### **3.2 PAINTING**

- A. With the exception of those parts and components customarily furnished unpainted, all metal surfaces shall be shop prepared and coated with rust inhibitive shop paint. Shop paint shall be fully compatible with the field paint specified. Machined surfaces shall be protected against damage and corrosion by other means.
- B. Perform field painting in accordance with the Section entitled "Field Painting".

**END OF SECTION**

**SECTION 40 95 14**  
**PLC CONTROL SYSTEM COORDINATION**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. This Section includes general requirements for the CONTRACTOR'S coordination with the Erie County Water Authority's (ECWA) Supervisory Control and Data Acquisition (SCADA) / Programmable Logic Control (PLC) system (referred to as SCADA System within this document).
- B. The CONTRACTOR shall contract separately with KAMAN Automation, Inc. 1000 University Ave. Rochester, NY 14607, (585)254-8840, for modification to the PLC control system for this project. KAMAN shall provide SCADA and PLC control system modifications in accordance with the Contract Documents and existing Process Control System.
- C. The CONTRACTOR shall coordinate his work with that of KAMAN to provide a complete operating system.
- D. The CONTRACTOR shall perform field-testing and a formal site acceptance test in conjunction with KAMAN as indicated on the Contract Drawings and detailed within this Specification.
- E. Coordination under this Contract shall include termination of all field wiring on the terminal strips within the respective panel, labeling and complete site acceptance testing of all input/output signals.
- F. KAMAN will update the existing PLC drawings for the PLC on the second floor in the Chemical Control Area for new instrumentation inputs.
- G. The Contract shall include control panel terminations to be made by KAMAN, with all field wiring and field terminations to be made by the CONTRACTOR. As part of the Contract, KAMAN shall supply any necessary hardware and equipment to make the necessary terminations.
- H. The Contract shall include the supply (by KAMAN) of Fluoride and Potassium Permanganate leak detection switches per ECWA spec LEAK-500-P-S-PTFE with 15 meter cables. This shall also include the termination of the switches and programming at the existing PLC on the second floor as well as startup and testing.
- I. The Contract shall include the supply (by Kaman) of a Potassium Permanganate ultrasonic transducer and transmitter, Siemens Sitran LU2. This shall also include the termination of the transmitter and programming at the existing PLC on the second floor as well as startup and testing.
- J. The Contract shall include the supply (by Kaman) of the Potassium Permanganate Control Panel. This should include termination of any wiring within the control panel and programming at the existing PLC on the second floor to accept any signals from the control panel. Also included is startup and testing.
- K. The Contract shall include the submittal of an updated Of-Record drawings package and O&M manuals provided by KAMAN.
- L. This Contract shall include a minimum of two (4 hour) training sessions on operation at the end of the project provided by KAMAN.



**PART 2 - PRODUCTS (BY KAMAN)**

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**2.1 GENERAL**

- A. The SCADA and PLC logic control system shall provide monitoring and control of the following equipment:
  - 1. Fluoride and Potassium Permanganate leak detection switches
  - 2. Potassium Permanganate ultrasonic transducer
  - 3. Coagulation Basin sludge analyzer
  - 4. Potassium Permanganate control panel

**2.2 COMPONENTS FURNISHED BY KAMAN**

- A. KAMAN will provide the SCADA Components and PLC components required for this project. Components provided by KAMAN shall be installed and connected by KAMAN unless otherwise indicated.

**2.3 SOFTWARE FURNISHED BY KAMAN**

- A. Software shall be of the same revision as existing plant PLC.

**PART 3 - EXECUTION**

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**3.1 INSTALLATION**

- A. General
  - 1. All SCADA system components shall be installed by KAMAN as specified, directed and recommended by the manufacturers.

**3.2 APPLICATIONS SOFTWARE (BY KAMAN)**

- A. General
  - 1. The OWNER's SCADA system will be modified to incorporate the control, monitor and log the operation of instrumentation and control panel that is to be installed under this Contract.
  - 2. The existing PLC control logic will be modified by KAMAN to incorporate the new instrumentation and control panel.
- B. PLC network startup requirements.
  - 1. The CONTRACTOR shall provide all conduit, cable and control wires providing 10'0" of spare control/status cable at each existing PLC Panel or control panel for termination by KAMAN.
  - 2. Following installation of the control cables by the CONTRACTOR and termination of these cables by KAMAN, the CONTRACTOR and KAMAN shall verify that the control/status signals are functioning correctly.

**3.3 SITE ACCEPTANCE TESTING (SAT)**

- A. General
  - 1. Following the installation of the SCADA system and connection of all field I/O signals, the CONTRACTOR and KAMAN shall prepare a system test procedure to verify the



proper transmission of all input and output signals to and from the I/O racks (full loop test). The field-testing procedure shall demonstrate conformance of the total system to these Specifications and the Project requirements. The CONTRACTOR shall correct any deficiencies found to be a result of his contract, at his own expense and the tests shall be repeated. This process shall continue until all tests have been successfully completed.

2. Documentation
  - a. Each input/output point shall be verified for proper operation. Proper operation includes instrumentation set-up and calibration, and verification that the interface between the instrument and the SCADA system is functioning properly. The SAT document shall include sign-off's for each I/O signal.
  - b. Analog input signals shall be tested at 4mA, 12mA and 20mA with a simulator and then verified for proper operation with the primary element (LIT). The raw value on the OIT shall be noted for each of the 3 signal levels. Instrument range and units shall be noted in the SAT documentation package.
  - c. Analog output signals shall be tested at 4mA, 12mA and 20mA from the OIT. The primary element (FCV, etc) shall be verified for proper operation at the 3 signal levels.
  - d. Digital input signals shall be tested in the energized and de-energized positions. The primary element (starter, LSH, ZSO, etc.) shall be exercised for this test when practical.
  - e. Digital output signals shall be tested in the energized and de-energized positions. The primary element (starter, ZC, etc.) shall be exercised and monitored for this test when practical.

## **PART 4 - PROCESS CONTROL DESCRIPTIONS**

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### **4.1 GENERAL**

- A. The existing PLC control logic will be modified by KAMAN.
- B. Process Control Description.
  1. Control sequences are not being modified as part of this contract. Therefore, control descriptions are not being provided.
  2. KAMAN shall coordinate with OWNER for existing control descriptions, should they be required for his work.

END OF SECTION

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## SECTION 43 12 11 AIR COMPRESSOR SYSTEM

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### PART 1 - GENERAL

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#### 1.1 SUMMARY

- A. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified or required to furnish, install and test the air compressor system, including but not limited to one air compressor, one compressed air dryer, piping, supports, control equipment and appurtenances.

#### 1.2 REFERENCES

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications except where more stringent requirements have been specified herein:
1. American Society for Testing and Materials (ASTM)
  2. American National Standards Institute (ANSI)
  3. National Electric Code (NEC)
  4. National Electrical Manufacturers Association (NEMA)
  5. American Gear Manufacturers Association (AGMA)
  6. American Water Works Association (AWWA)
  7. Underwriter's Laboratory (UL)

#### 1.3 SUBMITTALS

- A. In addition to the submittals specified in the General and Special Conditions, the CONTRACTOR shall submit the following:
1. Shop Drawings and Product Data
    - a. Detailed layout drawings of all components, including dimensions, weights, connection details and appurtenances.
    - b. Manufacturer's recommended vibration limits of the compressed air system.
    - c. Manufacturer's literature, specifications and engineering data sheets for each component, including materials of construction, operating characteristics, and recommended starts per hour. Manufacturer's information will be used to verify that the compressor selection is able to meet the performance criteria specified herein.
    - d. Motor performance data, wiring diagrams and one-line diagrams for Electrical Contractor's use, including current, power factor, voltage and efficiency.
    - e. External utility requirements such as air, water, power, and drain for each component.
    - f. Manufacturer's diagrams for air compressor piping.
    - g. Product delivery, storage, handling, and installation instructions for all equipment in this Section.
    - h. List of suggested spare parts and any special tools required for checking, testing,

replacement, and maintenance of the air compressor system.

- i. Manufacturer's equipment warranty.
- 2. Certificates
  - a. Manufacturer's certification that all materials furnished are in compliance with the applicable requirements of the referenced standards and this specification.
  - b. Certificate of installation for the air compressor system.
- 3. Operations and Maintenance Manuals
  - a. Provide copies of the manufacturer's operation and maintenance manuals in accordance with Section 01 78 23 entitled "Operations and Maintenance Data."

#### **1.4 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications:
  - 1. Manufacturer shall have a minimum of five years experience in 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. References and evidence of experience shall be provided if requested by the CONSULTANT.
- B. Component Supply and Compatibility
  - 1. All equipment in this Section shall be supplied by a single manufacturer who shall be responsible for the design, coordination and proper operation of the entire system. The system shall be fabricated, assembled, erected and placed in proper operating condition in full conformity with the drawings, specifications, engineering data, instructions and recommendations of the equipment manufacturer.
  - 2. All equipment of like size and type shall be of the same manufacturer for the purpose of parts interchangeability.

#### **1.5 DELIVERY, STORAGE AND HANDLING**

- A. Materials and equipment shall be boxed, crated or otherwise completely enclosed and protected from corrosion and deterioration during shipment, handling, and storage. Such boxes, crates or protection shall be clearly labeled with manufacturer's name, brand or model designation, type or grade, and color. Machined surfaces shall be flushed with heavy, noncorrosive oil, and gears and bearings shall be lubricated.
- B. Protect materials and equipment from exposure to the elements and keep dry at all times. Unload, handle and store materials and equipment in accordance with the manufacturer's recommendations.
- C. Materials and equipment damaged by handling and storage operations shall be repaired or replaced by the CONTRACTOR as directed by the CONSULTANT, at no additional cost to the OWNER.
- D. CONTRACTOR shall inspect the stored equipment weekly. The CONTRACTOR shall maintain a log of all inspections and maintenance actions performed prior to startup and shall turn over the log to the OWNER. Before equipment is put into operation, it shall be thoroughly cleaned and tested by the CONTRACTOR.

#### **1.6 WARRANTY**

- A. The air compressor system, including all components specified herein and all appurtenances

shall have a one year warranty against defects in workmanship and/or materials. Warranty period shall commence upon final acceptance and approval by the CONSULTANT.

## PART 2 - PRODUCTS

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### 2.1 MANUFACTURERS

- A. The following manufacturers are named to establish a standard of quality necessary for the project:
1. Ingersoll-Rand
  2. Or approved equal
- B. The above listed manufacturers are responsible for providing all components for the air compressor system, including the air compressor, dryer, piping and all appurtenances.

### 2.2 DESIGN CRITERIA

- A. Air Compressor
- |                             |                          |
|-----------------------------|--------------------------|
| Location:                   | Boiler Room              |
| Quantity:                   | 1                        |
| Type:                       | Electric, stationary     |
| Tank Capacity:              | 120-gallon (minimum)     |
| Number of Stages:           | 2-stage                  |
| Rated Flow:                 | 35 cfm                   |
| Pressure Range:             | 60-100 psi               |
| Inlet size:                 | 1.25-inch                |
| Discharge size:             | 0.75-inch                |
| Cooling System:             | Integrated After Cooling |
| Min. Operating Temperature: | -15°F                    |
| Max. Operating Temperature: | 115°F                    |
| Operating Speed:            | 1050 rpm                 |
| Motor Type:                 | Premium efficiency       |
| Motor Speed:                | 1775 rpm                 |
| Horsepower:                 | 10 HP                    |
| Electrical Requirements:    | 460V/ 3-phase/60 Hz      |
- B. Compressed Air Dryer
- |                        |                         |
|------------------------|-------------------------|
| Type:                  | Modular Desiccant Dryer |
| Quantity:              | 1                       |
| For Air Compressor HP: | 10 HP                   |

Minimum Working Pressure:	58 psi
Maximum Working Pressure:	232 psi
Minimum Inlet Temperature:	35°F
Maximum Inlet Temperature:	122° F
Pipe/Filter Connections	½-inch NPT
Dew Point:	-40°F
Refrigerant:	Activated Alumina Desiccant
Electrical Requirements:	110-230V/60Hz/Single Phase

## 2.3 MATERIALS OF CONSTRUCTION

1. Air Compressor
  - a. Compressor shall be tank mounted and shall have two stages. Compressor shall be splash lubricated.
  - b. Tank shall be a minimum of 120 gallons and shall be cast iron with a powder coated finish.
  - c. Compressor enclosure shall be rated in accordance with NEMA 1.
  - d. Mount motors and compressors on common steel base attached to receiver.
  - e. Compressors connected to motor by V-belt drive system with guard, and convenient method of belt tensioning.
  - f. Capable of operating continuously at 104 degrees F at specified output without overheating.
  - g. Air compressor shall be equipped with combination air intake filter silencer, oil filter, and discharge cushion chamber.
    - 1) Minimum Full-Load Efficiency: Not less than 93 percent.
  - h. Receiver shall have the following:
    - 1) Vertical welded steel receiver bearing ASME code stamped with inspection openings.
    - 2) Pressure gauge
    - 3) Automatic condensate drain valve with isolation valve
    - 4) Manual blowdown valve located at low point in receiver.
  - i. Lifting lugs shall be attached to equipment assemblies weighing over 100 pounds.
  - j. Anchor bolts shall be Type 316 SS.
  - k. Compressor Controls shall consist of the following:
    - 1) ON/OFF cyclic operation.
    - 2) Automatic low oil pressure shutdown with indicating light and oil pressure gauge.
    - 3) Enclosure shall be NEMA 250, Type 12 panel for indoor installation complete with the following:
      - a) Control power transformer

- b) HAND/OFF/AUTOMATIC switch
  - c) Pressure switches
  - d) Relays
  - e) System pressure indicator.
  - f) Indicating lights
  - g) Combination motor starter with overload protection
- 4) Control panel shall be mounted on the receiver and have prewired control components. Control components shall operate on 120-volt AC power supply.
2. Modular Dryer
- a. Dryer shall be a heatless, desiccant air dryer of modular construction and shall operate in conjunction with the air compressor specified in this Section. Dryer shall operate on a 4 minute fully cycle controlled by an electronic timer.
  - b. Airflow through the dryer shall be controlled by inlet valves and an out check valve housed in the inlet and out manifolds, respectively.
  - c. The quality of air provided shall meet or exceed the following when fitted with required filtration:
    - 1) Maximum remaining oil content: 0.01 mg/m<sup>3</sup> at 70°F.
    - 2) Particulate removal: up to 1 micron
    - 3) Air provided shall conform to ISO 8573.1.
  - d. Dryer Vessel:
    - 1) Dryer shall be modular by design and constructed from aluminum extrusion. Design shall incorporate the drying chambers, inlet, and outlet manifolds.
    - 2) Dryer extrusion shall be corrosion resistant and coated with dry powder epoxy paint finish for external corrosion protection.
  - e. Drying Material:
    - 1) Drying material shall be activated alumina or molecular sieve. Drying chambers shall be filled using the "snowstorm" technique to ensure consistent dew point and complete regeneration.
  - f. Pre-Filter
    - 1) Dryer shall include a coalescing type pre-filter, complete with borosilicate microfiber elements suitable for removal of particulate, liquid and aerosols as small as 0.01 microns.
    - 2) Pre-filter shall be constructed of pressure die cast aluminum and complete with an automatic drain valve.
    - 3) Pre-filter shall be guaranteed to withstand a 145 psig differential pressure without collapse.
    - 4) Manufacturers for pre-filter include Ingersoll Rand Model HE or approved equal.
  - g. After-Filter
    - 1) Dryer shall include one particulate type after-filter, complete with borosilicate microfiber elements suitable for removal of particulate down

to 100% at 1 micron.

- 2) After-filter shall be constructed of pressure die cast aluminum. After-filter shall be complete with a manual blowdown valve.
  - 3) After-filter shall be guaranteed to withstand a 145 psig differential pressure without collapse. The initial saturated pressure drop must not exceed 1 psig.
- h. The dryer instrumentation shall be housed in a shroud on the front of the dryer. Instrumentation shall consist of the following:
- 1) Column Pressure Gauges
  - 2) Power-On Indicator Light
  - 3) Energy Savings Indicator

## 2.4 SHOP TESTS

- A. All control panels shall be tested for intended operation/function.
- B. Dryer shall undergo a pressure decay test and operation/function test. Certified documentation showing results and date of the test shall be provided for approval by Engineer.

## PART 3 - EXECUTION

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### 3.1 INSTALLATION

- A. Installation shall be in complete accordance with manufacturer's instructions and the approved Shop Drawings.
- B. Equipment shall be installed on vibration isolators in accordance with manufacturer's instructions.
- C. Piping connections shall be made in accordance with the Contract Documents and with manufacturer's recommendations.
- D. Prior to energizing electric motor drive equipment, rotate drive motor by an external source to demonstrate free operation of mechanical parts. Do not energize equipment until safety devices are installed, connected and functional

### 3.2 MANUFACTURER'S FIELD SERVICE AND FIELD TESTS

- A. Engage the service of a qualified manufacturer's representative to assist in the installation, testing and startup of the air compression system included in this section. The duration of the service shall be as required to complete the successful startup of the equipment.
- B. Conduct a running test for each component of the system in the presence of the Engineer to determine its ability to operate within the performance limits specified. Equipment and controls shall be field tested in local and automatic mode. Testing in automatic mode shall be a minimum of 24 hours, continuous and uninterrupted. Contractor shall demonstrate that each part individually and all parts together, including appurtenances, function properly in the manner intended. All testing equipment and labor shall be by the Contractor.
- C. Vibration Test:
  1. System shall not develop amplitudes of vibration in excess of manufacturer's recommendations.
  2. Test with units installed and operating under normal conditions.



3. In the event units exhibit vibration in excess of manufacturer's recommendations, adjust or modify as necessary.
- D. Correct or replace all defective equipment revealed by or noted during field tests at no additional cost to the Owner and repeat field tests until specified results are acceptable to the Engineer.
- E. Engage the services of a qualified manufacturer's representative to provide instruction to the Owner's operations and maintenance personnel in the recommended operation and maintenance of the air compression equipment.

**3.3 PAINTING**

- A. With the exception of those parts and components customarily furnished unpainted, all metal surfaces shall be shop prepared and coated with rust inhibitive shop paint. Shop paint shall be fully compatible with the field paint specified. Machined surfaces shall be protected against damage and corrosion by other means.
- B. Field painting shall be in accordance with Section 09 91 00 entitled "Field Painting".

**END OF SECTION**

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**SECTION 46 21 90  
FLOCCULATION COMPARTMENT BAFFLE MODIFICATIONS**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. Modification of and repair to existing baffles in the Flocculation Compartments complete with all appurtenances necessary to complete the work as specified and shown on the Contract Documents.
- B. The existing baffles are manufactured of EPDM and were installed during the period of 2007 through 2010.
- C. The need for replacement of baffle panels is unlikely and will be determined during pre-installation inspection for each flocculation compartment.
- D. Repairs to and replacement of baffles will be completed under Bid Allowance Item XXXX.

**1.2 QUALITY ASSURANCE**

- A. If inspections indicate that any baffles need to be replaced as part of this project, acceptable manufacturers consist of the following.
  - 1. Thermafab, Inc.
  - 2. or Equal
- B. Experience
  - 1. All equipment furnished under this section shall be furnished by manufacturers who have at least 15 years' experience in the design and construction of industrial grade flexible thermoplastic products utilizing dielectric and thermal seaming processes.
  - 2. Qualified manufacturers shall have manufactured a minimum of 250,000 linear feet of baffles for municipal Clearwell and/or Flocculation Chamber applications.

**1.3 SUBMITTALS**

- A. General
  - 1. Submittals shall be in accordance with the provisions set forth in the General Provisions.

**1.4 WARRANTY**

- A. The baffle manufacturer (for any baffle replacement) shall provide the Owner a two-year warranty encompassing workmanship and materials.

**PART 2 - PRODUCTS**

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**2.1 MATERIALS**

- A. Replacement Baffle Material (if required):
  - 1. The fabric baffle shall be fabricated from synthetic material NSF 61 approved for

- contact with potable water with a polyester scrim.
2. Curtain materials shall be reinforced 8130 XR-3PW.

### **PART 3 - EXECUTION**

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#### **3.1 PRE-SUBMITTAL INSPECTION**

- A. Contractor shall conduct an inspection of each flocculation compartment prior to shop drawing submittal to verify dimensional data and assess installation requirements. Submittals shall reflect observed field conditions.
- B. The scope of baffle repairs will also be determined during the pre-submittal conference for each flocculation compartment.

#### **3.2 INSTALLATION**

- A. The installation Contractor shall modify the baffle system as shown and specified in the Contract Documents.
- B. Anchoring
  1. The bottom hem of the baffle shall be removed from the existing anchorage and re-attached to the new concrete wall by clamping the baffle material between batten strips and angle which is secured to the clearwell structure with expansion anchor bolts. This procedure also applies to intermediate support columns and vertical open ends, if applicable.
  2. All hardware shall be supplied in ready to install kits with angle and batten cut and pre-drilled to minimize field cutting and drilling of attachment hardware.
  3. All hardware provided shall be 316 stainless steel.
  4. All anchors to be used in concrete shall be Hilti KWIK BOLT II expansion anchors, ITW Ramset/Red Head Trubolt wedge anchors, Ankr-Tile II stud anchors or equal.
- C. Repairs:
  1. Where directed by Engineer, Contractor to repair punctures and tears to existing baffle materials. Repairs to be made in strict conformance to requirements set forth by the manufacturer of the original baffle material.
  2. Provide the services of a qualified manufacturer's field representative to supervise the installation of the baffle.

**END OF SECTION**



**SECTION 46 33 15**  
**POTASSIUM PERMANGANATE SYSTEM**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified or required to furnish, install and test the potassium permanganate system, including but not limited to FRP tanks, FRP baffles, chemical mixers, supports and appurtenances.

**1.2 REFERENCES**

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications except where more stringent requirements have been specified herein:
1. American Society for Testing and Materials (ASTM)
  2. American National Standards Institute (ANSI)
  3. National Electric Code (NEC)
  4. National Electrical Manufacturers Association (NEMA)
  5. American Gear Manufacturers Association (AGMA)
  6. American Water Works Association (AWWA)

**1.3 SUBMITTALS**

- A. In addition to the submittals specified in the General and Special Conditions, the Contractor shall submit the following:
1. Shop Drawings and Product Data
    - a. Drawings of the tanks showing all openings and penetrations and recommended size and location of support for the tanks.
    - b. Design calculations shall include, but not be limited to the following:
      - 1) Dead and live loads for the FRP tank.
      - 2) Critical speed and stress calculation for the mixer system.
      - 3) Mixer supports.
      - 4) Bearing life calculations for the mixer.
      - 5) Anchor design for the FRP tanks.
    - c. Corrosion resistance data for all materials in contact with chemicals.
    - d. Detailed layout drawings of the mixers, including dimensions, weights, connection details and appurtenances.
    - e. Manufacturer's literature, specifications and engineering data sheets for the mixers, impellers and motors, including materials of construction, operating characteristics, and recommended starts per hour. Manufacturer's information will be used to verify that the mixer selection is able to meet the performance criteria specified herein.

- f. Motor performance data, wiring diagrams and one-line diagrams for Electrical Contractor's use, including curves for torque, current, power factor, kilowatt and efficiency.
  - g. Product delivery, storage, handling, and installation instructions for all equipment in this Section.
  - h. List of suggested spare parts and any special tools required for checking, testing, replacement, and maintenance of the mixers.
  - i. Manufacturer's equipment warranty.
2. Critical speed and stress calculations for the mixer system.
  3. Certificates
    - a. Manufacturer's certification that all materials furnished are in compliance with the applicable requirements of the referenced standards and this specification.
    - b. Certificate of installation for the mixer.
  4. Operations and Maintenance Manuals
    - a. Provide copies of the manufacturer's operation and maintenance manuals in accordance with Section 01 78 23 entitled "Operations and Maintenance Data."

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
  1. Manufacturer shall have a minimum of five years experience in 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. References and evidence of experience shall be provided if requested by the Engineer.
- B. Component Supply and Compatibility
  1. All equipment in this Section shall be supplied by a single manufacturer who shall be responsible for the design, coordination and proper operation of the entire system. The system shall be fabricated, assembled, erected and placed in proper operating condition in full conformity with the drawings, specifications, engineering data, instructions and recommendations of the equipment manufacturer.
  2. All equipment of like size and type shall be of the same manufacturer for the purpose of parts interchangeability.

#### 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Before dismantling the mixing equipment for shipment, all wiring and mechanical connections shall be match-marked or tagged to ensure proper field assembly.
- B. Materials and equipment shall be boxed, crated or otherwise completely enclosed and protected from corrosion and deterioration during shipment, handling, and storage. Such boxes, crates or protection shall be clearly labeled with manufacturer's name, brand or model designation, type or grade, and color. Machined surfaces shall be flushed with heavy, noncorrosive oil, and gears and bearings shall be lubricated.
- C. Protect materials and equipment from exposure to the elements and keep dry at all times. Unload, handle and store materials and equipment in accordance with the manufacturer's recommendations.
- D. Materials and equipment damaged by handling and storage operations shall be repaired or replaced by the Contractor as directed by the Engineer, at no additional cost to the Owner.

- E. Contractor shall inspect the stored equipment weekly. Contractor shall manually rotate or slide all moving parts of the mixers, and renew the lubrication as recommended by the mixer manufacturer. The Contractor shall maintain a log of all inspections and maintenance actions performed prior to startup and shall turn over the log to the Owner. Before equipment is put into operation, it shall be thoroughly cleaned and tested by the Contractor.

## 1.6 WARRANTY

- A. The potassium permanganate system, including all components specified herein and all appurtenances shall have a one year warranty against defects in workmanship and/or materials. Warranty period shall commence upon final acceptance and approval by the Engineer.

## PART 2 - PRODUCTS

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### 2.1 FRP COMPONENTS

#### A. General

1. Materials used in the manufacture of the FRP process equipment components shall be new stock of the best quality and shall be free from all defects and imperfections that *might affect the performance of the finished product*. The size and number of air bubbles shall be held to a minimum. Laminations shall be dense and without voids, dry spots, cracks or crazes. There shall be no areas of the laminate that are excessively resin rich or poorly wetted out.
2. After fabrication, all cut ends, holes and abrasions of the FRP process equipment components shall be sealed with a compatible resin coating to prevent intrusion of moisture.
3. Unless otherwise specified, mechanical anchors, nuts, bolts, washers and other hardware shall be Type 316 stainless steel.

#### B. Manufacturers:

1. The following manufacturers are named to establish a standard of quality necessary for the project:
  - a. Belding Tank Technologies
  - b. Belco Mfg. Company
  - c. Or approved equal
2. The above listed manufacturers are responsible for providing all FRP components for the potassium permanganate system, including the tank, baffle walls and mixer supports.

#### C. Design Criteria

##### 1. Potassium Permanganate Tanks

Location:	Chemical Control Area
Chemical:	Potassium Permanganate (1-4% solution)
Chemical Specific Gravity:	1.02 g/mL (liquid)
	2.703 g/cm <sup>3</sup> (solid)
Tank Type:	FRP, Internal sloped bottom, flat top with top mounted mixer

Quantity:	Three (3)
Min. capacity:	950 gallons per tank
Size Restrictions:	
Diameter:	≤ 5' 8" with molded fittings
Height:	≤ 6' 6"

- a. Size restrictions are based on the freight elevator size. Freight elevator is approximately 5' 10" wide by 5' 10" deep and 7'3" tall. Dimensions to be field verified by the Contractor prior to construction of tanks. Molded fittings are preferred; however if, due to the size restrictions, molded fittings are not practical, threaded fittings shall be acceptable.

2. Baffle Walls

Location:	Potassium Permanganate FRP tanks
Chemical:	Potassium Permanganate (1-4% solution)
Chemical Specific Gravity:	1.02 g/mL (liquid) 2.703 g/cm <sup>3</sup> (solid)
Quantity:	Four (4) / tank
Material:	FRP

D. Physical Properties and Performance Requirements

1. FRP tanks shall have the following minimum physical properties:

<u>Property</u>	<u>Test</u>	<u>Minimum Value</u>
Tensile Strength	ASTM D-638	9,000 psi
Flexural Strength	ASTM D-790	19,000 psi
Modulus of Elasticity (Tangent)	ASTM D-790	8.0 x 10 <sup>5</sup> psi
Barcol Hardness	ASTM D-2853	40
Water Absorption	ASTM D-570	0.2% (in 24 hours)

- a. Normal Temperature: Ambient, indoor installation, 65° - 90°F. Chemicals may be delivered at higher or lower temperatures, depending on season.
- b. Maximum Temperature: 100°F.
- c. Normal Internal Loads: Hydrostatic.
- d. External Loads: Appurtenances as shown and specified herein.

2. FRP baffle walls shall have the following minimum physical properties:

<u>Property</u>	<u>Test</u>	<u>Minimum Value</u>
Tensile Strength	ASTM D-638	24,000 psi
Flexural Strength	ASTM D-790	35,000 psi
Flexural Modulus	ASTM D-790	2.0 x 10 <sup>6</sup> psi
Barcol Hardness	ASTM D-2853	40
Notched Izod	ASTM D-256	10 ft-lbs/in
Water Absorption	ASTM D-570	0.2% (in 24 hours)



## E. Materials of Construction

## 1. Potassium Permanganate Tanks

- a. The tanks shall be designed for above ground, vertical installation and shall be capable of containing the chemicals specified herein at atmospheric pressure.
- b. The finished tank surface shall be free from visual defects such as foreign inclusions, air bubbles, dry spots, pin holes, craters, delamination and cracking that will impair the serviceability of the tank.
- c. The minimum required wall thickness for the cylinder straight shell must be sufficient to support its own weight in an upright position without any external support. Wall thickness for the cylinder straight shell must also be able to support top-mounted mixer. Additional supports for mixer are permitted and shall be in accordance with Paragraph 2.1.E.4. Flat areas shall be provided for locating large fittings on the cylinder straight shell.
- d. The top head shall be integrally molded with the cylinder shell. The minimum thickness of the top head shall be equal to the thickness of the cylinder shell.
- e. Resin
  - 1) Contractor shall submit data indicating the compatibility of the resin selected for fabrication of each tank with the liquid being stored in the tank.
  - 2) A maximum of 10% by weight of styrene may be added to the liquid premium vinyl ester resin with steam post cure as received.
  - 3) A maximum of 4% by weight thixotropic agent, Cab-O-Sil (or equal) may be added to the resin to prevent runoff.
  - 4) The cure system used for the resin shall be in accordance with the resin manufacturer's current recommendations. Proper curing of the resin is the tank manufacturer's responsibility.
  - 5) All products fabricated in this Section shall be cured to at least 90 percent of the minimum Barcol hardness specified by the resin manufacturer. This requirement applies to both interior and exterior surfaces. A separately cured, unreinforced gel coat shall not be used.
- f. Reinforcement
  - 1) Chemical surfacing mat shall be type A or type C glass, 10 to 20 mils thick, with a silane finish and a styrene soluble binder. Use no additive in the corrosion barrier.
  - 2) Chopped strand mat shall be type E glass, 1, 1-1/2, or 2 oz. per sq. yd. with a silane finish and a styrene soluble binder. Strands shall not be larger than No. 130 (13,000 yd. per lb.).
  - 3) Woven cloth or woven roving (60 end max.) shall be type E glass with "Volan" methacrylate chromic chloride or silane type finish.
- g. Fabrication details
  - 1) Laminate shall consist of an inner surface (corrosion barrier), interior layer and exterior layer.
  - 2) Surfaces exposed to chemicals being handled shall be resin rich, and reinforced with a 10 to 20 mil thick type A or type C glass surfacing mat as specified above.

- 3) The inner surface layer exposed to the corrosive environment shall be followed with a layer composed of resin, reinforced only with non-continuous glass fiber strands applied in a minimum of two plies of chopped-strand mat equivalent to a total of 3 oz/sf. Glass content in this layer shall be 27+- 5%. No other glass product is permitted between these layers.
  - 4) Subsequent reinforcing layers shall be continuous-strand roving. If additional longitudinal strength is required, the use of other reinforcements, such as woven fabric, non-woven unidirectional or bi-directional fabric, chopped-strand mat, or chopped strands, may be interspersed in the winding to provide additional strength. Glass content of this filament-wound structural layer shall be 50% to 80% by weight.
  - 5) All edges of reinforcement material in wet lay-up shall be lapped 1 inch minimum for cloth and mat and 2 inches minimum for woven roving. Lapped edges of adjacent layers shall be staggered to obtain the maximum possible strength
  - 6) All piping connections and access openings shall be flanged. Gussets shall be added where necessary.
- h. Shell Joints
- 1) Shell joints shall be resin glass reinforced with a minimum thickness of the heaviest section being joined. The reinforcement shall extend on each side of the joint a sufficient distance to make the joint as strong as the shell.
  - 2) All wet overlap require that the curved surfaces under the overlay first be roughened. The roughened area shall be wider than the glass cover, but this roughened area subsequently must be completely covered with new resin.
- i. Tank Connections:
- 1) Provide piping connections as shown on the Contract Drawings and as specified herein. Pipe shall conform to the requirements of Division 40 and applicable sections on chemical piping, pipe supports, fittings, valves and appurtenances.
  - 2) Connections shall be molded into the tank when possible. If molded connections are not possible, connections can be secondarily bonded into tank shells. Threaded fittings are acceptable.
  - 3) All flanged nozzles 10" and smaller on the tank shall be rated for a minimum of 50 psi. Flanged nozzles 12" to 24" shall be rated for a minimum of 25 psi.
  - 4) All flanged nozzles 6" and smaller be gusseted with either conical type or plate type gussets.
  - 5) Flanged nozzles shall have a 6" projection as measured from the face of the flange to the inside wall of the tank.
  - 6) Flanged nozzles shall be mounted radially, perpendicular to the side shell. Top flanged nozzles shall be mounted parallel to the vertical axis of the tank with bolt holes straddling this principle axis. Provide gaskets for blind flanges.
  - 7) All edges associated with the fittings shall be trimmed smooth.
  - 8) Fittings shall be provided with EPDM or Viton gaskets and Type 316

stainless steel or titanium bolts. Selected material shall be compatible with the chemical being stored within the tank.

- j. Tanks shall be provided with a certification label stating the following:
    - 1) Name of manufacturer.
    - 2) Total capacity and working capacity of tank.
    - 3) Date of manufacture.
    - 4) Name, concentration and specific gravity of chemical to be stored within.
    - 5) Tank identification number as shown on the registration certificate.
  - k. Certification label shall be provided in accordance with the following:
    - 1) Type – Stick-on type, made of all purpose polyester, single character letters and numbers, chemical resistant
    - 2) Color – Black letters and numbers on white background
    - 3) Size – Letters and numbers shall be upper case, minimum of 1" in height
2. Baffle Walls
- a. Tank manufacturer shall be responsible for providing baffle walls for installation within each tank to encourage better mixing.
  - b. Baffle walls shall be a minimum of ¼-inch thick by 6-inches deep and extend the height of the tank.
  - c. A minimum of four (4) baffles shall be provided per tank as shown on the Contract Drawings.
  - d. Baffle walls shall be mounted to the tank per manufacturer's design. Where required, support brackets shall be polyester plastic resin, reinforced with glass fiber. All nuts, fasteners and anchor bolts used in conjunction with the support brackets shall all be Type 316 stainless steel. All bolts shall be a minimum of 3/8".
3. Mixer Supports
- a. Tank manufacturer shall be responsible for designing a mixer cover plate and any additional supports that are necessary to properly support the mixer, specified in Paragraph 2.2, during operation, including operation at maximum speed.
  - b. Manufacturer is responsible for providing any connection or mounting details between the cover plate or supports and the tank.
  - c. Mixer supports shall be located on top of each tank so as not to consume tank capacity.
  - d. Supports shall be constructed of either painted carbon steel or FRP.

## 2.2 MIXERS

### A. General

- 1. The mixer and its appurtenances shall be designed for intermittent operation in a chemical mixing application as specified below. The mixers shall not overload the motors at any point within the operating limits recommended by the mixer manufacturer.

### B. Manufacturers

- 1. The following manufacturers are named to establish a standard of quality necessary for

the project:

- a. Brawn Mixer, Inc.
- b. Or approved equal

C. Design Requirements

1. Mixers

No. of mixers/tank:	1
No. of tanks:	3
Type:	Vertical, top mounted, turbine impeller
No. of impellers/ mixer:	1

2. Motors

Motor horsepower (max):	1.5 hp
Maximum speed:	1750 rpm
Motor efficiency:	Premium efficiency
Duty:	Intermittent
Insulation:	Class F
Voltage:	460 V, 3 ph, 60 hz
Service factor:	1.15 minimum
Motor enclosure:	Severe duty, TEFC, 316 SS construction

D. Materials of Construction

1. Mixer shaft

- a. The mixer shaft shall be constructed of Type 316 stainless steel and shall be totally overhung. Wetted parts shall be compatible with chemical being mixed.
- b. Impeller shaft deflection shall not exceed  $\frac{1}{4}$ " per 10 feet of length.
- c. Separation of the mixer shaft from the speed reducer shall not require disassembly of the speed reducer internal gearing.
- d. Manufacturer shall provide critical speed and stress calculations for the mixer system. Critical speed shall be chosen based on service conditions and use of stabilizing devices.

2. Drive Assembly and Speed Reducer

- a. The speed reducer shall be specifically designed for use in a mixing application.
- b. Gear drive shall be a low headroom right angle type, comprised of single reduction helical gearing. The gear drive efficiency shall be a minimum of 98%.
- c. The speed reducer, including all helical gearing, shall be designed in accordance with the latest AGMA standards.
- d. The speed reducer shall be rated for both 24-hours per day continuous operation and intermittent operation without the need for external cooling.
- e. Removal of the speed reducer housing shall not be required for general maintenance including motor changes, oil system maintenance or the

replacement of anti-friction bearings.

- f. Speed reducer shall be equipped with lifting lugs to enable lifting of the fully assembled gear drive, lower shaft and impellers.
- g. The speed reducer output shaft shall be constructed and supported so that shaft deflection caused by operating loads does not affect alignment of the anti-friction bearings or cause misalignment of the gearing during mixer operation. The gearing shall be designed to withstand normal and shock loads that are transmitted to the gear drive from the mixer shaft and impeller assembly.
- h. Lubrication
  - 1) The gear drive shall be permanently lubricated. Lubrication shall allow start-up in highly variable climates without the need for primers, heaters or other special equipment.
  - 2) A single oil drain shall be provided at the low point of the gear reducer to allow for oil drainage and maintain a maximum residual oil of no more than  $\frac{1}{4}$ " in the drive housing. Drive units shall incorporate an effective dry-well seal to eliminate leakage down the drive output shaft. All oil fill and drain lines and grease fittings shall be located so as to be easily accessible.
  - 3) The oil level shall be measured with a dipstick and sight glass or other visual means.
  - 4) Grease lubrication of some working parts is permissible provided adequate separation is made between these parts and oil lubricated parts.
  - 5) Lubrication shall be provided by Lubrication Engineers, Inc.
- i. Housing
  - 1) The speed reducer housing shall be constructed of 316 SS.
  - 2) All non-machined housing, retainer and cage interior surfaces shall be coated with gear case sealer.
  - 3) All speed reducer openings below the operating oil level shall be positively sealed with compressible gaskets.
  - 4) A dry well shall be provided to exclude oil from the output portion of the gear drive.
  - 5) The speed reducer breather shall be located above the maximum possible oil foam level.

### 3. Bearings

- a. Bearings shall be ball, roller or tapered roller anti-friction type.
- b. Replacement of any gear drive anti-friction bearing, with the exception of the bearing supporting the output shaft, shall not require removal of the speed reducer housing from its foundation.
- c. Bearings shall have a minimum L10 life of 100,000 hours and shall be designed based on the torsional, thrust and lateral loads encountered. Bearing life calculations shall include the bending loads caused by the forces acting at the mixing/impeller.
- d. Output shaft bearings shall be grease lubricated with grease inlet and relief fittings accessible from the mounting surface. Grease fittings shall be marked and protected with a removable neoprene cover.

### 4. Impeller

- a. The impeller assembly shall be constructed of Type 316 stainless steel, minimum 3/16-inch thick and shall be dynamically balanced, axial flow type impeller. Impeller shall have a minimum of three blades and shall be fabricated to ensure smooth and vibration-free operation.
  - b. Impeller blades shall be bolted to the mixer shaft using Type 316 stainless steel hardware. Impeller assembly shall be designed to be supported on the shaft, but be removable from the shaft.
  - c. The impeller assembly shall be liquid level insensitive and shall not have an electrical power consumption change of 15% or more with a 3-inch change in liquid level.
5. Motor
- a. Motors shall be capable of supplying the maximum rated horsepower and rpm at the design conditions and within the ranges scheduled herein. Motors shall be capable of withstanding all forces which may be imposed during the course of normal operation.
  - b. A flexible coupling and coupling guard shall be provided between the electric motor drive and the gear box input shaft.
  - c. Bearings: Regreasable, shielded, antifriction ball bearing suitable for radial and thrust loading.
6. Accessories and Supports
- a. Unless otherwise specified, all nuts, bolts and hardware shall be type 316 stainless steel.
  - b. Each mixer shall be supplied with a stainless steel nameplate listing at minimum, the following:
    - 1) Manufacturer and Model number
    - 2) Serial number
    - 3) Rated horsepower
    - 4) Insulation class
    - 5) Voltage and amperage at full load
    - 6) Full load speed
    - 7) Impeller code/size
    - 8) Service factor
    - 9) Frequency
  - c. Mixer supports shall be provided in accordance with Paragraph 2.1.E.4, above.
7. Spare Parts
- a. Each mixer shall be furnished with a recommended spare parts kit. Spare parts shall be packed in sturdy containers with clear identification markings and shall be stored in a dry, warm location until transferred to the Owner at the completion of the project.

## 2.3 FABRICATION

### A. Shop Fabrication and Assembly

1. Fabricate and assembly tank system components in the shop to the greatest extent

possible to ensure proper assembly in the field.

## 2.4 SHOP PAINTING

- A. Speed reducers, motors and appurtenances shall be primed and finish coated with shop paint. If any damage to the paint system occurs prior to operation, the equipment shall be repainted as directed by the Engineer.
- B. Gears, bearing surfaces, machined surfaces, and other surfaces that are to remain unpainted shall receive heavy application of grease or other rust-resistant and corrosion resistant coating. Coating shall be maintained during storage and until equipment is placed into operation.
- C. Corrosion-resistant parts such as plastic, fiberglass and stainless steel shall not be painted.
- D. As required, certify in writing that shop primer and field coating systems are compatible with each other and conform to the Section entitled "Field Painting."

## PART 3 - EXECUTION

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### 3.1 INSPECTION

- A. Contractor shall examine the conditions under which the Work is to be installed and shall notify the Engineer in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.
- B. Inspect tanks prior to installation. If damaged, notify Engineer and manufacturer at once.
- C. Do not install damaged tanks until repairs are made in accordance with the manufacturer's written instructions and approved by the Engineer.

### 3.2 INSTALLATION

- A. Tanks
  - 1. Tanks shall be installed in accordance with the configuration shown on the Contract Drawings and in accordance with the manufacturer's installation procedures.
- B. Mixers
  - 1. Install mixing system in accordance with the configuration shown on the Contract Drawings, the approved Shop Drawings and the manufacturer's recommendations.
  - 2. Installation shall include furnishing and applying an initial supply of grease and oil as recommended by the manufacturer.
  - 3. Prior to energizing electric equipment, rotate drive motor by an external source to demonstrate free operation of mechanical parts. Do not energize equipment until safety devices are installed, connected and functional. Verify that power and control cables are securely fastened/anchored and will not be damaged by mixer operation.
  - 4. Contractor shall make all necessary adjustments to the equipment to provide complete, operational mixer installations meeting the requirements of the Contract Documents.

### 3.3 MANUFACTURER'S FIELD SERVICE AND FIELD TESTS

- A. Engage the service of a qualified manufacturer's representative to assist in the installation, testing and startup of each chemical day tank included in this section. The duration of the service shall be as required to complete the successful startup of the tank.
- B. Field Testing: Tanks
  1. After installation is complete but before piping connections are made, the tank shall be filled to the bottom of the overflow with clean water and left full for a period of 24 hours before the tank is determined to be liquid tight. Should any leakage occur, repairs shall be made in accordance with the manufacturer's specifications and re-tested. Testing shall be witnessed by the Engineer and repeated until satisfactory performance is demonstrated.
  2. The Contractor shall be responsible and assume all costs for supplying a source of clean water for testing purposes.
  3. If clean water is not available for testing or for any reason it is necessary for the tank manufacturer to return to the site at a later date to perform this water test, the Contractor shall assume all costs incurred.
  4. Contractor shall be responsible for all costs should any damage occur to the tank due to delay of water testing.
- C. Field Testing: Mixers
  1. Conduct a running test for each mixer in the presence of the Engineer to determine its ability to operate within the performance limits specified. Equipment and controls shall be field tested in local and automatic mode. Testing in automatic mode shall be a minimum of 24 hours, continuous and uninterrupted. Contractor shall demonstrate that each part individually and all parts together, including appurtenances, function properly in the manner intended. All testing equipment and labor shall be by the Contractor.
  2. Correct or replace all defective equipment revealed by or noted during field tests at no additional cost to the Owner and repeat field tests until specified results are acceptable to the Engineer.
  3. Engage the services of a qualified manufacturer's representative to provide instruction to the Owner's operations and maintenance personnel in the recommended operation and maintenance of the mixing equipment.

### 3.4 CLEANING

- A. After installation is complete and connections made, clean tank and nozzles with detergent and rinse with 130°F water.

**END OF SECTION**



**SECTION 46 33 17**  
**FIELD FABRICATED FRP TANKS**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified or required to furnish, install and test field fabricated FRP tanks, including all appurtenances.

**1.2 REFERENCES**

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:
1. American Society for Testing and Materials (ASTM)
  2. American National Standards Institute (ANSI)
  3. American Water Works Association (AWWA)
  4. New York State Department of Environmental Conservation (NYSDEC)
  5. Occupational Safety and Health Administration (OSHA).

**1.3 SUBMITTALS**

- A. In addition to the submittals specified in the General and Special Conditions, the Contractor shall submit the following:
1. Shop Drawings and Product Data
    - a. Detailed description of the laminate and the type of reinforcing to be used.
    - b. Detailed tank drawings including dimensions, sizes, capacity, weights, wall thickness, materials of construction, anchorage, fittings, openings, penetrations, piping and details of all required appurtenances. Drawings shall show fabrication, assembly and installation details, including recommended size and locations of supports.
    - c. Manufacturer's literature, specifications, chemical compatibility data, resin data sheet and engineering data.
    - d. Corrosion resistance data for all materials in contact with chemicals.
    - e. Product delivery, storage and handling instructions.
    - f. Manufacturer's warranty.
  2. Certificates:
    - a. Manufacturer's certification that all materials furnished are in compliance with the applicable requirements of the referenced standards and this specification.
    - b. Certificate of Installation from the manufacturer indicating approval of Contractor's installation.
- B. Operation and Maintenance Manuals:
1. Provide copies of the manufacturer's operation and maintenance manuals in accordance with Section 01 78 23 entitled "Operations and Maintenance Data."

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
  - 1. Manufacturer shall have a minimum of five years experience in producing and installing field fabricated FRP tanks and shall show evidence of satisfactory completion in at least five installations for each chemical application.
  - 2. References and evidence of experience shall be provided if requested by the Engineer.
- B. Quality Control:
  - 1. All dimensions will be taken with the tank in the vertical position, unfilled. Tank dimensions will represent the exterior measurements.
    - a. The tolerance for the outside diameter, including out of roundness, shall be per ASTM D 1998-04.
    - b. The tolerance for fitting placements shall be +/- 0.5 in. in elevation and 2 degrees radial at ambient temperature.
- C. Component Supply and Compatibility:
  - 1. All equipment in this Section shall be supplied by a single manufacturer who shall be responsible for the design, coordination and proper operation of the entire system. The system shall be fabricated, assembled, erected and placed in proper operating condition in full conformity with the drawings, specifications, engineering data, instructions and recommendations of the equipment manufacturer.
  - 2. All field fabricated FRP tanks of like size and type shall be supplied by one tank manufacturer.

#### 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Materials and equipment shall be boxed, crated or otherwise completely enclosed and protected from deterioration during shipment, handling, and storage. Such boxes, crates or protection shall be clearly labeled with manufacturer's name, brand or model designation, type or grade, and color.
- B. Unload, handle and store materials and equipment in accordance with the manufacturer's recommendations.
- C. Storage shall be provided in a manner to prevent cracking, twisting, bending, breaking, chipping or damage of any kind to the materials or equipment specified in this Section, including damage due to overexposure to the sun. Components shall be protected from physical damage including effects of weather, water, and construction debris. Materials and equipment damaged by handling and storage operations shall be repaired or replaced by the Contractor as directed by the Engineer, at no additional cost to the Owner.
- D. Materials and equipment damaged by handling and storage operations shall be repaired or replaced by the Contractor as directed by the Engineer, at no additional cost to the Owner.

#### 1.6 WARRANTY

- A. Tank and appurtenances shall carry a two year warranty against defects in workmanship and/or materials. Warranty period shall commence upon final acceptance and approval by the Engineer.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Materials used in the manufacture of the FRP process equipment components shall be new stock of the best quality and shall be free from all defects and imperfections that might affect the performance of the finished product. The size and number of air bubbles shall be held to a minimum. Laminations shall be dense and without voids, dry spots, cracks or crazes. There shall be no areas of the laminate that are excessively resin rich or poorly wetted out.
- B. After fabrication, all cut ends, holes and abrasions of the FRP process equipment components shall be sealed with a compatible resin coating to prevent intrusion of moisture.
- C. Manufacturer shall be responsible for the basic design of the FRP tanks based on the Contract Documents including wall thickness, methods and locations of support and stiffener requirements. The design is subject for review and approval by Engineer.
- D. Unless otherwise specified, mechanical anchors, nuts, bolts, washers and other hardware shall be Type 316 stainless steel.

### 2.2 MANUFACTURERS:

- A. The following manufacturers are named to establish a standard of quality necessary for the project:
  1. Creco Tanks
  2. Ershigs, Inc.
  3. Or approved equal
- B. The above listed manufacturers are responsible for providing all FRP components for the fluoride system, including the tank and supports.

### 2.3 DESIGN CRITERIA

- A. Fluoride Tanks
 

Location:	Chemical Control Area
Chemical:	Fluoride (23-27% solution)
Chemical Specific Gravity:	1.234 at 15.6°C at 24% concentration
Tank Type:	FRP, Internal sloped bottom
Quantity:	Two (2) at Sturgeon Point WTP One (1) at Van de Water WTP
Nominal Capacity:	6,000 gallons per tank
Min. Working Capacity:	5,000 gallons per tank
Size Restrictions:	
Diameter:	≤ 5' 8" with molded fittings
Height:	≤ 6' 6"

  1. Size restrictions are based on the freight elevator size. Freight elevator is approximately 5' 10" wide by 5' 10" deep and 7'3" tall. Dimensions to be field verified by the Contractor prior to construction of tanks. Molded fittings are preferred;

however if, due to the size restrictions, molded fittings are not practical, threaded fittings shall be acceptable.

B. Physical Properties and Performance Requirements

1. FRP tanks shall have the following minimum physical properties:

<u>Property</u>	<u>Test</u>	<u>Minimum Value</u>
Tensile Strength	ASTM D-638	9,000 psi
Flexural Strength	ASTM D-790	18,000 psi
Flexural Modulus	ASTM D-790	4.5 x 10 <sup>5</sup> psi
Barcol Hardness	ASTM D-2853	35
Notched Izod	ASTM D-256	10 ft-lbs/in
Water Absorption	ASTM D-570	0.2% (in 24 hours)

- a. Normal Temperature: Ambient, indoor installation, 65° - 90°F. Chemicals may be delivered at higher or lower temperatures, depending on season.
- b. Maximum Temperature: 100°F.
- c. Normal Internal Loads: Hydrostatic.
- d. External Loads: Appurtenances as shown and specified herein.

## 2.4 MATERIALS OF CONSTRUCTION

A. FRP Tanks

1. The tanks shall be designed for above ground, vertical installation and shall be capable of containing the chemicals specified herein at atmospheric pressure.
2. Tanks shall be fabricated in place in accordance with manufacturer's recommendations and this Article 3 of this Section.
3. The finished tank surface shall be free from visual defects such as foreign inclusions, air bubbles, dry spots, pin holes, craters, delamination and cracking that will impair the serviceability of the tank.
4. The minimum required wall thickness for the cylinder straight shell must be sufficient to support its own weight in an upright position without any external support.
5. The minimum thickness of the top head shall be equal to the thickness of the cylinder shell.
6. Resin
  - a. Contractor shall submit data indicating the compatibility of the resin selected for fabrication of each tank with the liquid being stored in the tank.
  - b. A maximum of 10% by weight of styrene may be added to the liquid premium vinyl ester resin with steam post cure as received.
  - c. A maximum of 4% by weight thixotropic agent, Cab-O-Sil (or equal) may be added to the resin to prevent runoff.
  - d. The cure system used for the resin shall be in accordance with the resin manufacturer's current recommendations. Proper curing of the resin is the tank manufacturer's responsibility.
  - e. All products fabricated in this Section shall be cured to at least 90 percent of the minimum Barcol hardness specified by the resin manufacturer. This requirement applies to both interior and exterior surfaces. A separately cured, unreinforced

gel coat shall not be used.

7. Reinforcement
  - a. Chemical surfacing mat shall be type A or type C glass, 10 to 20 mils thick, with a silane finish and a styrene soluble binder.
  - b. Corrosion Barrier: Resin-rich interior surface of nominal 100-120 mils using chopped strand glass backin the veil. No additive shall be used in the corrosion barrier.
  - c. Chopped strand mat shall be type E glass, 1, 1-1/2, or 2 oz. per sq. yd. with a silane finish and a styrene soluble binder. Strands shall not be larger than No. 130 (13,000 yd. per lb.)
  - d. Woven cloth or woven roving (60 end max.) shall be type E glass with "Volan" methacrylate chromic chloride or silane type finish.
8. Fabrication details
  - a. Laminate shall consist of an inner surface (corrosion barrier), interior layer and exterior layer.
  - b. Surfaces exposed to chemicals being handled shall be resin rich, and reinforced with a 10 to 20 mil thick type A or type C glass surfacing mat as specified above.
  - c. The inner surface layer exposed to the corrosive environment shall be followed with a layer composed of resin, reinforced only with non-continuous glass fiber strands applied in a minimum of two plies of chopped-strand mat equivalent to a total of 3 oz/sf. Glass content in this layer shall be 27+- 5%. No other glass product is permitted between these layers.
  - d. Tanks shall be constructed using the Hand-Lay-Up method. Manufacturer shall be responsible for ensuring the strength of the tank and joints is adequate for storing the specified volume of chemical. Manufacturer shall add additional reinforcement as necessary during the installation process.
  - e. All edges of reinforcement material in wet lay-up shall be lapped 1 inch minimum for cloth and mat and 2 inches minimum for woven roving. Lapped edges of adjacent layers shall be staggered to obtain the maximum possible strength.
  - f. All piping connections and access openings shall be flanged. Gussets shall be added where necessary.
9. Shell Joints
  - a. Shell joints shall be resin glass reinforced with a minimum thickness of the heaviest section being joined. The reinforcement shall extend on each side of the joint a sufficient distance to make the joint as strong as the shell.
  - b. All wet overlap require that the curved surfaces under the overlay first be roughened. The roughened area shall be wider than the glass cover, but this roughened area subsequently must be completely covered with new resin.
10. Tank Connections:
  - a. Provide piping connections as shown on the Contract Drawings and as specified herein. Pipe shall conform to the requirements of Division 40 and applicable sections on chemical piping, pipe supports, fittings, valves and appurtenances.
  - b. Connections shall be molded into the tank when possible. If molded connections are not practical due to size restrictions, threaded fittings are acceptable.
  - c. All flanged nozzles on the tank shall be rated for 50 psi.

- d. All flanged nozzles 6" and smaller be gusseted with either conical type or plate type gussets.
  - e. Flanged nozzles shall have a 6" projection as measured from the face of the flange to the inside wall of the tank.
  - f. Flanged nozzles shall be mounted radially, perpendicular to the side shell. Top flanged nozzles shall be mounted parallel to the vertical axis of the tank with bolt holes straddling this principle axis. Provide gaskets for blind flanges.
  - g. All edges associated with the fittings shall be trimmed smooth.
  - h. Fittings shall be provided with EPDM or Viton gaskets and Type 316 stainless steel or titanium bolts. Selected material shall be compatible with the chemical being stored within the tank.
11. Tanks shall be provided with a certification label stating the following:
- a. Name of manufacturer.
  - b. Total capacity and working capacity of tank
  - c. Date of manufacture.
  - d. Date of assembly.
  - e. Name, concentration and specific gravity of chemical to be stored within.
  - f. Tank identification number as shown on the registration certificate.
12. Certification label shall be provided in accordance with the following:
- a. Type - Stick-on type, made of all purpose polyester, single character letters and numbers, chemical resistant.
  - b. Color - Black letters and numbers on white background.
  - c. Size - Letters and numbers shall be upper case, minimum of 1" in height.

### PART 3 - EXECUTION

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#### 3.1 INSPECTION

- A. Contractor shall examine the conditions under which the Work is to be installed and shall notify the Engineer in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.
- B. Inspect tank sections prior to installation. If damaged, notify Engineer and manufacturer at once.
- C. Do not install damaged tanks until repairs are made in accordance with the manufacturer's written instructions and approved by the Engineer.

#### 3.2 INSTALLATION

- A. Tanks shall be manufactured in sections and field assembled on site due to site restrictions. Tanks shall be fabricated in accordance with the configuration shown on the Contract Drawings and in accordance with the manufacturer's installation procedures.
- B. Utilize all hold down lugs supplied to secure tank to pad. Hold down lugs shall be grouted or shimmed to prevent excessive loads being transferred to the tank shell.
- C. Joints between sections shall be FRP welded. Joints shall be sealed and secure to prevent leaking.

- D. Size restrictions are based on the freight elevator size. Freight elevator is approximately 5' 10" wide by 5' 10" deep and 7'3" tall. Dimensions to be field verified by the Contractor prior to construction of tanks.

**3.3 MANUFACTURER'S FIELD SERVICE AND FIELD TESTS**

- A. Engage the service of a qualified manufacturer's representative to assist in the installation, testing and startup of each fluoride tank included in this section. The duration of the service shall be as required to complete the successful startup of the tank.
- B. Field Testing:
  - 1. After installation is complete but before piping connections are made, the tank shall be filled to the bottom of the overflow with clean water and left full for a period of 24 hours before the tank is determined to be liquid tight. Should any leakage occur, repairs shall be made in accordance with the manufacturer's specifications and re-tested. Testing shall be witnessed by the Engineer and repeated until satisfactory performance is demonstrated.
  - 2. The Contractor shall be responsible and assume all costs for supplying a source of clean water for testing purposes.
  - 3. If clean water is not available for testing or for any reason it is necessary for the tank manufacturer to return to the site at a later date to perform this water test, the Contractor shall assume all costs incurred.
  - 4. Contractor shall be responsible for all costs should any damage occur to the tank due to delay of water testing.

**3.4 CLEANING**

- A. After installation is complete and connections made, clean tank and nozzles with detergent and rinse with 130°F water.

**END OF SECTION**

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**SECTION 46 33 42**  
**DIAPHRAGM-TYPE CHEMICAL FEED SYSTEM**

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**PART 1 - GENERAL**

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**1.1 SUMMARY**

- A. This Section includes diaphragm-type chemical feed pumps, complete with pump, motors, control equipment and appurtenances, as shown and specified in the Contract Documents, for the sodium hydroxide system. This Section includes, but is not limited to, the following:
1. Feed pumps and motors
  2. Controls
  3. Calibration column
  4. Pulsation dampeners
  5. Backpressure valve
  6. Pressure relief valves
  7. Pressure gauges
  8. Miscellaneous fittings, valves, adapters and transition pieces as required.
  9. Manufacturer fabricated shelf with pre-piped back panel

**1.2 REFERENCES**

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:
1. American Bearing Manufacturers Association (ABMA).
  2. American Gear Manufacturer's Association (AGMA).
  3. American National Standards Institute (ANSI).
  4. American Society for Testing and Materials (ASTM).
  5. American Water Works Association (AWWA).
  6. Institute of Electrical and Electronics Engineers (IEEE).
  7. National Electrical Code (NEC).
  8. National Electrical Manufacturers' Association (NEMA).
  9. National Sanitary Foundation (NSF).

**1.3 SUBMITTALS**

- A. In addition to the submittals specified in the General and Special Conditions, the CONTRACTOR shall submit the following:
1. Shop Drawings and Product Data:
    - a. Manufacturer's literature, specifications, chemical compatibility data and engineering data including: dimensions, materials of construction, sizes, weights, connection details and performance data.
    - b. Detailed fabrication, installation and control drawings, including any required or

recommended modifications to the proposed layout on the Contract Drawings.

- c. Motor performance data, wiring diagrams and one-line diagrams, including horsepower, motor requirements and efficiencies.
- d. Control panel front elevation, interior component layout, wiring diagrams and component catalog data.
- e. Instructions for handling, storing, and installing equipment.

B. Certificates

- 1. Manufacturer's certification that all materials furnished are in compliance with the applicable requirements of the referenced standards and this specification.
- 2. Certificate of installation for the pumps.

C. Operation and Maintenance Manuals:

- 1. Provide copies of the manufacturer's operation and maintenance manuals in accordance with Section 01 78 23 entitled "Operations and Maintenance Data."

#### 1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

- 1. Manufacturer shall have a minimum of five years of experience in producing substantially similar equipment, and shall be able to show evidence of at least five installations for each chemical application in satisfactory operation for at least five years.
- 2. References and evidence of experience shall be provided if requested by the Engineer.

B. Component Supply and Compatibility:

- 1. Pumps, motors and appurtenances shall be supplied by a single pump manufacturer who shall be responsible for the proper application, engineering, testing, operation and start-up of the equipment as specified herein.
- 2. All pump components of like size and type shall be the product of the same manufacturer for purposes of parts interchangeability.
- 3. Materials and equipment shall be fully compatible with the specified service conditions and shall be integrated into the overall assembly by the pump manufacturer.

#### 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of material including unloading, storage and handling of diaphragm-type chemical feed pumps shall be in accordance with the manufacturer's recommendation.
- B. Materials and equipment shall be boxed, crated or otherwise completely enclosed and protected from corrosion and deterioration during shipment, handling, and storage. Such boxes, crates or protection shall be clearly labeled with manufacturer's name, brand or model designation, type or grade, and color. Machined surfaces shall be flushed with heavy, noncorrosive oil, and gears and bearings shall be lubricated.
- C. Protect materials and equipment from exposure to the elements and keep dry at all times. Unload, handle and store materials and equipment in accordance with the manufacturer's recommendations. Protect steel, packaged materials, and electronics from corrosion and deterioration.
- D. Materials and equipment damaged by handling and storage operations shall be repaired or replaced by the Contractor as directed by the Engineer, at no additional cost to the Owner.

**1.6 WARRANTY**

- A. Diaphragm-type chemical feed pumps, including pumps, motors, control equipment and appurtenances shall have a one year warranty against defects in workmanship and/or materials. Warranty period shall commence upon final acceptance and approval by the Engineer.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. The following manufacturers are named to establish a standard of quality necessary for the Project:
1. Pulsafeeder, Series 7120
  2. Milton Roy, mRoy Series A
  3. Or approved equal

**2.2 EQUIPMENT PERFORMANCE**

- A. System Description:
1. Feeds pumps shall be hydraulically balanced diaphragm type, with a measuring piston that reciprocates within a cylinder and causes hydraulic oil to deflect a diaphragm.
  2. The pump shall provide a straight-through internal flow path for the pumped fluid with no restriction other than the valve system.
  3. The hydraulic oil system shall include means to automatically relieve excess hydraulic pressure and make up oil or bleed off vapors.
- B. Performance Criteria:

Quantity Required	3
Service (Chemical and % Solution)	Sodium Hydroxide (NaOH), 25% solution
Specific Gravity of Pumped Fluid at 60 degrees F	1.27
Temperature Range of Pumped Fluid (degrees F)	40 to 100
Minimum Feed Rate (gals/hr)	1.8
Maximum Feed Rate (gals/ hr)	20
Maximum Pressure (psi)	150
Motor (HP) - maximum	0.5
Motor Type	AC
Motor (volts/phase/Hertz)	460V/3-phase/60Hz

Maximum RPM:	1800
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### 2.3 MATERIALS OF CONSTRUCTION

#### A. General:

1. All wetted surfaces of the pumps and appurtenances shall be suitable for continuous exposure to the chemical service and concentration specified in Article 2.2.

#### B. Pump Construction:

1. Feed pumps shall be positive displacement, hydraulically actuated diaphragm type. Packed plunger and mechanically actuated diaphragms shall not be accepted.
2. The feed pump shall use a common gear and food grade hydraulic fluid. Pump designs requiring two separate oils shall not be accepted.
3. Materials of Construction
  - a. Liquid ends: 316 SS
  - b. Diaphragm: PTFE
  - c. Head: 316 SS
  - d. Valve Body: 316 SS
  - e. Seats: 316 SS
  - f. Ball (check): 316SS
  - g. Seals: Viton or Buna N
4. Pump must be capable of operation at a minimum internal fluid pressure of 9 psia (4 psi vacuum).
5. Pump must be capable of operating under a completely dry or starved suction condition with integral pressure relief valve at maximum pressure setting, without damage to diaphragm or pump.
6. The pump shall be able to withstand closed suction or discharge valves without damage to the internals of the pump.
7. Pump shall be equipped with a manually actuated hydraulic purge valve that can be used to validate air-free hydraulics, or so that the diaphragm integrity can be easily verified without pump disassembly.
8. The liquid shall enter the reagent head at the bottom and exit at the top through gravity seating double ball-type check valves. Valve and seat shall be individually replaceable and sealed by an o-ring or flat gasket.
9. Hydraulically Actuated Diaphragm
  - a. The diaphragm shall be supported on both the process and hydraulic oil side using contour plates that restrict the diaphragm travel.
  - b. The diaphragm shall be capable of sealing under full head-bolt torque limits without stressing the diaphragm.
10. Stroke and Speed Adjustment
  - a. Pump shall be provided with an auto-lock system for the manual (handwheel) stroke length control mechanism, as standard to prevent drift.
  - b. Maximum stroking speed for the feed pump at its rated capacity shall be 150 strokes per minute and the minimum stroking speed shall be 30 strokes per

minute.

- c. Capacity shall be adjusted by the hydraulic bypass method. A separate control plunger that reciprocates in concert with the primary plunger shall operate within an adjustable control spool that is adjustable. A percent scale and vernier shall indicate stroke length.
- d. Flow adjustment shall be from 0 to 100%, with a guaranteed accuracy of  $\pm 1\%$  steady state on set point over a minimum flow turndown range of 10:1.

11. Pump Drive Housing

- a. Motors are to be coupled directly to the gear shaft without belts, chains, or other linkage.
- b. Pump drive housing shall have integral mounting holes to facilitate direct mounting to a footing surface without the need for a separate pump base piece.

- 12. The pump's moving parts shall be totally enclosed with no opportunity for moving parts to be exposed during operation. All moving parts shall be submerged in lubricating oil during operation.

C. Diaphragm Leak Detection Device:

- 1. Provide diaphragm leak detection device including base, gauge and contact closure switch for alarm and pump shutdown. The detection device shall consist of two diaphragms separated by a hollow intermediate ring. Alarm shall be wired to a common pump fault status output contact.
- 2. Factory installed in the reagent head.
- 3. Pressure: Maximum 1,000 psi; minimum 5 psig
- 4. Detection level: 5 psig
- 5. Alarm enclosure: NEMA 4X
- 6. Alarm signal: One output.
- 7. Pressure gauge: 0-50 psig (minimum range)
- 8. Materials: PTFE diaphragms and stainless steel ring and tubing.

D. Tubing

- 1. Clear, flexible reinforced PVC tubing shall be installed between the pump fittings and the suction and discharge piping.

E. Controls

- 1. Each feed pump shall be provided with a control panel. Control panel shall provide all functions to power, protect, locally operate and locally monitor the feed pump.
- 2. Control panel shall have a NEMA 4X enclosure with a hinged pad lockable door.
- 3. Control panel shall have a single point 480 VAC, three phase, 60 Hertz input power connection with main disconnect switch lockable in the open position. Control panel shall include transformers and power conversion equipment as necessary for components requiring voltage characteristics other than the input power voltage characteristics. Controls shall operate at 120 volts maximum.
- 4. Control panel shall include the pump variable frequency drive and all devices necessary to provide the specified functions, control and interfaces.
- 5. Control panel shall have, as a minimum, the following door mounted control functions:
  - a. LOCAL-OFF-REMOTE selector switch. LOCAL mode shall enable start/stop and

- speed control from the feed pump control panel. REMOTE mode shall enable start/stop control and speed control from the process control system (PCS).
  - b. INCREASE and DECREASE speed control.
  - c. RUN and FAULT indication.
  - d. Speed indication.
6. Control panel shall provide the following inputs and outputs for interfacing with the PCS:
- a. 4-20 mA analog input. Pump speed shall be linearly proportional to this input.
  - b. 4-20 mA output. Output signal shall be linearly proportional to the pump speed.
  - c. Start/stop control from a voltage-free contact input.
  - d. Voltage-free contact output for REMOTE mode indication.
  - e. Voltage-free contact output for run indication.
  - f. Voltage-free contact output for fault indication. Output shall indicate all pump fault parameters including diaphragm leak.
- F. Pump, motor and controls shall be factory assembled and wired requiring only connection of incoming power and control circuits. All wiring shall be enclosed in conduit in accordance with the Division 26 Sections.

## 2.4 APPURTENANCES

- A. Calibration Column:
1. Construction: Transparent, clear tube.
  2. Calibration columns must have an inlet port (bottom) and outlet port (top) that can be connected to piping via threaded or solvent welded joints.
  3. Calibration columns shall be calibrated in fractions of gallons in proportion to the column size.
  4. Provide PVC isolation ball valve at inlet port.
  5. Size calibration columns to provide at least 60 seconds of storage at maximum rated pump flow.
- B. Pulsation Dampeners:
1. Provide a pulsation dampener on the discharge piping of each diaphragm feed pump as shown or indicated on the Contract Drawings.
  2. Pulsation dampeners shall be air-charged, diaphragm type, complete with a valved air charge connection and pressure gauge graduated from zero to 200 psi.
  3. Size pulsation dampeners to allow no more than five percent fluctuation in discharge pressure. Pulsation dampener bladder and lower housing shall be fabricated of materials recommended by the manufacturer and suitable for the chemical being pumped.
  4. Pulsation dampeners shall be supported independently of the discharge piping.
- C. Pressure Relief Valves:
1. Provide two pressure relief valves with each pump or as required by the manufacturer.
  2. Pressure relief valve shall be field-adjustable without requiring removal from the

piping, and shall be adjustable from 0-200 psi.

3. Pressure relief valve and diaphragm material shall be compatible with the fluid being pumped and the piping system material. Valve size shall be as shown on the Contract Drawings.
- D. Backpressure Valves:
1. Provide two backpressure valves with each pump or as required by the manufacturer.
  2. Backpressure valve shall be field adjustable from 0-50 psi without requiring removal from the piping.
  3. Backpressure valve material shall be compatible with the fluid being pumped and the piping system material. Valve size shall be as shown on the Contract Drawings.
- E. Pressure Gauges
1. Pressure gauge shall be provided in accordance with the Section entitled "Miscellaneous Valves, Traps, and Accessories" and as shown on the Contract Drawings.

## 2.5 SHOP TESTING

- A. Each pump assembly shall be hydrostatically tested and operated from zero to maximum capacity.
- B. Manufacturer shall perform a calibration test and inspect all components prior to, during and following shop testing.

## 2.6 TOOLS AND SPARE PARTS

- A. Each pump shall be furnished with the following spare parts that are identical to and interchangeable with the parts installed.
  1. One quart of touch-up paint
  2. One spare diaphragm
  3. One complete set of gaskets for each gasketed cover and connection
  4. Two double ball-type check valves.
  5. One complete oil change for the diaphragm hydraulic oil
  6. One replacement o-ring or flat gasket for the diaphragm seat
- B. Spare parts shall be packed in sturdy containers with clear identification markings and shall be stored in a dry, warm location until transferred to the Owner at the completion of the project.

## PART 3 - EXECUTION

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### 3.1 INSTALLATION

- A. Installation shall be in complete accordance with the manufacturer's instructions and the approved Shop Drawings.
- B. Contractor shall accurately set equipment in location, alignment and elevation.
- C. Piping connections shall be made in accordance with the Contract Documents.
- D. Piping and appurtenances shall be supported independently of the diaphragm-type chemical feed.

- E. Prior to energizing electric motor drive equipment, rotate drive motor by an external source to demonstrate free operation of mechanical parts. Do not energize equipment until safety devices are installed, connected and functional.

### **3.2 START-UP AND FIELD TESTING**

- A. Engage the service of a qualified manufacturer's representative to assist in the installation, testing and startup of each diaphragm-type chemical feed system included in this section. The duration of the service shall be as required to complete the successful startup of the equipment.
- B. Conduct a 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. Equipment and controls shall be field tested in local and automatic mode. Testing in automatic mode shall be a minimum of 24 hours, continuous and uninterrupted. Contractor shall demonstrate that each part individually and all parts together function properly in the manner intended. All testing equipment and labor shall be by the Contractor.
- C. Perform initial testing using potable water to ensure the system operates as specified, prior to testing with the chemical service.
- D. Correct or replace all defective equipment revealed by or noted during field tests at no additional cost to the Owner and repeat field tests until results are acceptable to the Engineer.
- E. The Contractor shall engage the services of a qualified manufacturer's representative to instruct the Owner's operations and maintenance personnel in the recommended operation and maintenance of the materials and equipment.

### **3.3 PAINTING**

- A. Pumps, motors, and appurtenances shall be shop primed and finish coated. If any damage to the paint system occurs, the equipment shall be repainted as directed by the Engineer.
- B. All exposed metallic surfaces excluding hardware shall receive primer and finish coating in accordance with the Section entitled "Field Painting."
- C. Corrosion-resistant parts such as plastic, fiberglass and stainless steel shall not be painted.
- D. Gears, bearing surfaces, machined surfaces, and other surfaces that are to remain unpainted shall receive heavy application of grease or other rust-resistant coating. Coating shall be maintained during storage and until equipment is placed into operation.
- E. As required, Contractor shall certify in writing that shop primer and finish coating systems are compatible with each other and conform to the Section entitled "Field Painting."

**END OF SECTION**



## SECTION 46 33 48 INSTALLATION OF SLUDGE ANALYZERS

---

### PART 1 - GENERAL

---

#### 1.1 SUMMARY

- A. This Section includes installation, startup, and testing of three different On-Line Sludge Level Analyzer (sludge analyzer) manufacturers as part of demonstration testing. One sludge analyzer will be provided by each manufacturer. Installation of the equipment, providing power, and saving/collecting data shall be the responsibility of the CONTRACTOR and OWNER. A detailed outline of the OWNER's, CONSULTANT's and Sludge Analyzer manufacturer's responsibilities is provided in Part 3 of this Section.
- B. The CONTRACTOR is responsible for all necessary coordination with the OWNER, CONSULTANT, and Sludge Analyzer manufacturer.

### PART 2 - PRODUCTS

---

#### 2.1 MANUFACTURERS

- A. Three manufacturers have agreed to participate in the On-line Sludge Level Analyzers demonstration testing. Those three manufacturers are as follows:
  - 1. Markland Automatic Sludge Blanket Level Detector – optical (infrared) sensor
  - 2. Pulsar Sludge Finder 2 –ultrasonic sensor
  - 3. Hach Sonatax – ultrasonic sensor
- B. Each manufacturer shall supply their analyzer for a test period of 30-60 days.

### PART 3 - EXECUTION

---

#### 3.1 INSTALLATION AND START-UP

- A. The sludge analyzer shall be installed by the CONTRACTOR in accordance with the manufacturer's recommendations. Each analyzer shall be installed for a duration of 30-60 days. Installations of the analyzers will be staggered so that only one analyzer is tested at a time.
- B. All analyzers shall be installed in a single Coagulation Basin. Analyzers shall be installed in the same approximate location for each test duration.
- C. CONTRACTOR shall be responsible for modifying the installation of the different sludge analyzers based on each manufacturer's recommendations.
- D. CONTRACTOR shall provide necessary cable if sufficient lengths for installation are not provided by the manufacturer.
- E. The CONTRACTOR shall be responsible for maintaining the sludge analyzers throughout the entire demonstration testing.
- F. CONTRACTOR shall be responsible for providing power connection to the analyzer. CONTRACTOR shall coordinate all power requirements with the OWNER.
- G. Any permanent modifications to the Coagulation Basin required for installation of any of the sludge analyzers shall be approved by the OWNER prior to installation.

### 3.2 MANUFACTURER'S SERVICES

- A. The sludge analyzer manufacturer shall provide remote services during installation and startup, including but not limited to, installation and start-up instructions and troubleshooting.
- B. The CONTRACTOR shall start and operate the equipment and conduct field tests to adequately show that the equipment has been properly installed and will function as herein specified, with the direction of the manufacturer. CONTRACTOR shall demonstrate that each part individually and all parts together, including appurtenances, function properly in the manner intended. The manufacturer shall instruct the CONTRACTOR on any required adjustments. All tests shall be subject to the CONSULTANT's review.

### 3.3 FIELD TESTS

- A. Prior to acceptance by the OWNER, an operational test of each analyzer shall be conducted by the CONTRACTOR for the duration of four hours and shall determine if the installed equipment meets the purpose and intent of the specifications. Be alert to any undue noise, or other operational problems. Tests shall demonstrate that all equipment is:
  - 1. Properly Installed.
  - 2. Electrically, mechanically, structurally, and otherwise acceptable.
  - 3. Is in proper alignment and has been properly connected.
  - 4. Is safe and in optimum working condition.
  - 5. Conforms to the specified operating characteristics.
- B. Following the operational tests, the CONTRACTOR shall provide a report to the CONSULTANT, which includes all test information.
- C. Power for testing will be provided by the OWNER. CONTRACTOR shall furnish all labor, materials and equipment required to perform the field tests.

### 3.4 DIVISION OF RESPONSIBILITIES

- A. Each manufacturer is responsible for providing one sludge analyzer and associated control box for demonstration testing for a period of 30-60 days.
- B. CONTRACTOR shall be responsible for installation and start-up for each of the three analyzers. CONTRACTOR shall ensure that the analyzer remains in operation for the duration of the demonstration testing and shall be responsible for any maintenance or adjustments necessary.
- C. CONTRACTOR shall provide all necessary power connections for the sludge analyzer installation and operation.
- D. CONTRACTOR shall be responsible for uninstalling the sludge analyzer, control box, and all associated accessories and for sending equipment back to manufacturer at the conclusion of the demonstration test period for that analyzer.
- E. Once the analyzer has been installed, OWNER shall be responsible for collecting and saving necessary data

**END OF SECTION**

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:**

<u>NAME OF FORM</u>	<u>PAGE NUMBER(S)</u>
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 H&K SERVICES, INC.

AUTHORIZED REPRESENTATIVE LINDA L VEITH

ADDRESS 12025 LEON ROAD, LEON NY 14751

TELEPHONE NUMBER 716-296-5290

PROJECT NAME STURGEON POINT & VAN de WATER IMPROVEMENTS PROJECT

PROJECT NUMBER 201500169

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: R.P. Mechanical ADDRESS: Springville NY TELE NO. 716-592-3067 IRS NO. 16-1408636	Plumbing / HVAC	\$321,509.00		YES <u>Pending</u> NO _____	
NAME: _____ ADDRESS: _____ TELE NO. _____ IRS NO. _____				YES _____ NO _____	
NAME: _____ ADDRESS: _____ TELE NO. _____ IRS NO. _____				YES _____ NO _____	
NAME: _____ ADDRESS: _____ TELE NO. _____ IRS NO. _____				YES _____ NO _____	

PART A CONTINUED

III. Assistance offered by CONTRACTOR to MBE's as to bonding, union requirements, obtaining work capital etc...

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_


IV. Total Dollar Amount to be subcontracted to Minority Business Enterprise(s): \$ 321,509.00

V. Total Amount of Bid: \$ 2,957,800.00

VI. MBE Percent (%) of project bid: 295,780.00

VII. YOU MUST ATTACH COPIES OF RELEVANT CORRESPONDENCE AND DOCUMENTS INCLUDING RETURN RECEIPTS.

11/22/16  
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  
Buffalo, New York 14227



WAIVER

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

TELEPHONE NUMBER \_\_\_\_\_  
(AREA CODE) (NUMBER)

1. CONTRACTOR has made a good faith effort to adopt subcontracting on this project to those trades, professions, supplies, etc. for which minority business enterprises bids could be solicited; and
2. The total percentage of the bids which could be Subcontracted in trades, professions, supplies, etc. for which minority business enterprises bids could be solicited is less than 10%.

A waiver, as provided for by the Erie County Water Authority is hereby requested on the grounds that there are no/insufficient (circle the appropriate term) minority business enterprise in the market area of this project which do subcontracting in the following fields (list all trades, professions, supplies, etc. which could be subcontracted on this project):

- |          |           |
|----------|-----------|
| 1. _____ | 6. _____  |
| 2. _____ | 7. _____  |
| 3. _____ | 8. _____  |
| 4. _____ | 9. _____  |
| 5. _____ | 10. _____ |

(use additional sheets if necessary)

If a partial waiver is granted the CONTRACTOR will make a good faith effort to meet the reduced goal.

\_\_\_\_\_  
DATE

\_\_\_\_\_  
SIGNATURE OF AUTHORIZED REPRESENTATIVE OF COMPANY

Granted in whole \_\_\_\_\_

Granted in part \_\_\_\_\_

Comments \_\_\_\_\_

\_\_\_\_\_  
EQUAL OPPORTUNITY OFFICIAL / TITLE

\_\_\_\_\_  
DATE

\_\_\_\_\_  
LETTING DEPARTMENT REPRESENTATIVE / TITLE

\_\_\_\_\_  
DATE

**ERIE COUNTY WATER AUTHORITY  
MINORITY BUSINESS ENTERPRISE  
JOINT VENTURE DISCLOSURE AFFIDAVIT**

To Be Submitted With Part A  
Where Applicable

Joint Ventures: \_\_\_\_\_  
Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Principal Office: \_\_\_\_\_  
Office Phone: \_\_\_\_\_  
Home Phone: \_\_\_\_\_

Percent of minority ownership in terms of profit and loss sharings:

Capital contributions by each joint venture and accounting therefore:

Equipment and supply contributions by each joint venturer and accounting therefore:

Any ownership options for ownership or loans between the joint venturers - identify terms thereof:

How and by whom the on-site work will be supervised and administered:

I, \_\_\_\_\_, as  
representative of \_\_\_\_\_ Company,  
do hereby swear or affirm that I am authorized to act on its behalf and that in this capacity and to  
the best of my knowledge and belief, the information provided herewith relevant to the joint  
venture of \_\_\_\_\_  
is accurate, complete and current, and fairly represents the joint venture; further, that I have  
personally reviewed the material and assured myself of its accuracy. It is recognized and  
acknowledged that the statements herein are being given under oath and any material  
misrepresentation will be grounds for terminating any contract which may be awarded in reliance  
hereon.

\_\_\_\_\_  
SIGNATURE

**ERIE COUNTY WATER AUTHORITY  
MINORITY BUSINESS ENTERPRISE UTILIZATION REPORT - PART B**

CONTRACTOR \_\_\_\_\_ CONTRACT NAME \_\_\_\_\_

I. List all bona fide minority business enterprises, Subcontractors, suppliers, professional personnel, or joint venture firms, with whom you have entered into a binding agreement in accordance with the Minority Business Utilization Goal set forth by the Erie County Water Authority. Include minority trucking firms that will be utilized and included and estimated dollar amount. This information must be submitted to the Erie County Water Authority when the project is 30% complete.

(USE REVERSE SIDE IF MORE SPACE IS NEEDED) MINORITY OWNED FIRMS	TYPE OF WORK	DATE CONTRACT EXECUTED	TOTAL EXPENDED TO DATE	AMOUNT REMAINING
NAME: _____ ADDRESS: _____ _____ IRS #: _____				
NAME: _____ ADDRESS: _____ _____ IRS #: _____				

\*Erie County Water Authority reserves the right to require documentation including, but not limited to, canceled checks to verify these amounts:

- II. Total Dollar Amount to be Subcontracted to minority Business Enterprise(s):  
\$ \_\_\_\_\_
- III. Total dollar amount expended to date: \$ \_\_\_\_\_
- IV. Total amount of bid: \$ \_\_\_\_\_
- V. MBE Percent (%) of project bid: \$ \_\_\_\_\_

I, \_\_\_\_\_ as an official representative of \_\_\_\_\_, do hereby certify that the information listed above is correct and complete.

\_\_\_\_\_  
NAME

\_\_\_\_\_  
TITLE

\_\_\_\_\_  
DATE

PART B CONTINUED

(USE REVERSE SIDE IF MORE SPACE IS NEEDED) MINORITY OWNED FIRMS	TYPE OF WORK	DATE CONTRACT EXECUTED	TOTAL EXPENDED TO DATE	AMOUNT REMAINING
NAME: _____ ADDRESS: _____ _____ IRS #: _____				
NAME: _____ ADDRESS: _____ _____ IRS #: _____				
NAME: _____ ADDRESS: _____ _____ IRS #: _____				
NAME: _____ ADDRESS: _____ _____ IRS #: _____				
NAME: _____ ADDRESS: _____ _____ IRS #: _____				
NAME: _____ ADDRESS: _____ _____ IRS #: _____				
NAME: _____ ADDRESS: _____ _____ IRS #: _____				
NAME: _____ ADDRESS: _____ _____ IRS #: _____				
NAME: _____ ADDRESS: _____ _____ IRS #: _____				



**MINORITY BUSINESS ENTERPRISE UTILIZATION REPORT - PART C  
CERTIFICATION OF EXPENDITURES TO MBE's**

(To be completed by the prime CONTRACTOR and  
submitted at the 75% payment level)

CONTRACTOR \_\_\_\_\_

CONTRACT: \_\_\_\_\_

MBE	PART B CONTRACT AMOUNT OF ESTIMATE	TOTAL EXPENDED TO DATE	ESTIMATED AMOUNT REMAINING

\* Erie County Water Authority reserves the right to require documentation including, but not limited to, canceled checks to verify these amounts.

I, \_\_\_\_\_  
\_\_\_\_\_ as an official representative of \_\_\_\_\_,

do hereby certify that the information listed above is correct and complete.

\_\_\_\_\_  
NAME

\_\_\_\_\_  
TITLE

\_\_\_\_\_  
DATE

MINORITY BUSINESS ENTERPRISE UTILIZATION REPORT - PART D

FINAL CERTIFICATION OF EXPENDITURES TO MBE's

(to be completed by the prime CONTRACTOR and submitted with the request for final payment)

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

CONTRACT: \_\_\_\_\_

MBE	TOTAL AMOUNT EXPENDED

TOTAL OF ALL MBE  
SUB-CONTRACTS \$ \_\_\_\_\_

AMOUNT OF  
CONTRACT \_\_\_\_\_

FINAL MBE  
PERCENTAGE \_\_\_\_\_

I, \_\_\_\_\_, as an official  
representative of \_\_\_\_\_,

do hereby certify that the information listed above is correct and complete.

\_\_\_\_\_  
NAME

\_\_\_\_\_  
TITLE

\_\_\_\_\_  
DATE

## ACCOUNTABILITY

The CONTRACTOR shall be fully accountable for its performance under this contract and agrees to answer under oath all questions relevant to the performance thereof and to any transaction, act, or omission had, done or omitted in connection therewith if called before the Erie County Water Authority, any Judicial, County or State Officer or agency empowered to investigate the Contract or its performance.

**APPENDIX B**

**INSURANCE REQUIREMENTS**

**ERIE COUNTY WATER AUTHORITY**



# CERTIFICATE OF LIABILITY INSURANCE

H&amp;KS-01

OP ID: VP

DATE (MM/DD/YYYY)  
11/14/2016

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

**IMPORTANT:** If the certificate holder is an **ADDITIONAL INSURED**, the policy(ies) must be endorsed. If **SUBROGATION IS WAIVED**, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

<b>PRODUCER</b> Vanner Insurance Agency 11 Pinchot Court, Suite 100 Amherst, NY 14228 Jason N Reid	<b>CONTACT NAME:</b> Victoria Puglia	
	<b>PHONE (A/C, No, Ext):</b> 716-688-8888	<b>FAX (A/C, No):</b> 716-929-8664
<b>E-MAIL ADDRESS:</b> vpuglia@vannerinsurance.com		
<b>INSURER(S) AFFORDING COVERAGE</b>		<b>NAIC #</b>
<b>INSURER A:</b> Wesco Insurance Company		25011
<b>INSURER B:</b> Ace American Insurance Co		22667
<b>INSURER C:</b>		
<b>INSURER D:</b>		
<b>INSURER E:</b>		
<b>INSURER F:</b>		

**INSURED** H&K Services, Inc.  
PO Box 12  
12025 Leon Road  
Leon, NY 14751

**COVERAGES**                      **CERTIFICATE NUMBER:**                      **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	<b>GENERAL LIABILITY</b> <input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> Contractual Liab	X	X	WPP111649203 02468 25011 A XIV	09/24/2016	09/24/2017	EACH OCCURRENCE \$ 1,000,000
	<input type="checkbox"/> GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC						DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 100,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COM/OP AGG \$ 2,000,000
A	<b>AUTOMOBILE LIABILITY</b> <input checked="" type="checkbox"/> ANY AUTO ALL OWNED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS	X	X	WPP111649203 02468 25011 A XIV	09/24/2016	09/24/2017	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000
	<input type="checkbox"/> SCHEDULED AUTOS NON-OWNED AUTOS						BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (PER ACCIDENT) \$
B	<input checked="" type="checkbox"/> UMBRELLA LIAB <input type="checkbox"/> EXCESS LIAB	X	X	N10879012003 02257 22667 A++ XV	09/24/2016	09/24/2017	EACH OCCURRENCE \$ 10,000,000
	<input type="checkbox"/> CLAIMS-MADE DED <input checked="" type="checkbox"/> RETENTION \$ 10,000						AGGREGATE \$ 10,000,000
	<b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b> ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) <input type="checkbox"/> If yes, describe under DESCRIPTION OF OPERATIONS below		N/A				WC STATUTORY LIMITS OTH-ER E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$
A	Lease/Rented Equip			WPP111649203 02468 25011 A XIV	09/24/2016	09/24/2017	1000 Ded 100,000

**DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES** (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Project: OBG-12A Sturgeon Point and VanDeWater Improvements  
Erie County Water Authority is additional insured on a primary and non-contributory basis under general liability, auto liability and umbrella liability. Waiver of subrogation applies on all policies.

Project # 201500169  
MPO# 7970 OBG 12A  
APPROVED DEC 08 2016

<b>CERTIFICATE HOLDER</b>  Erie County Water Authority Attn: Anthony Alessi 295 Main Street, Suite 350 Buffalo, NY 14203	<b>CANCELLATION</b> SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.  <b>AUTHORIZED REPRESENTATIVE</b> 
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**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.**

**ADDITIONAL INSURED – OWNERS, LESSEES OR  
CONTRACTORS – AUTOMATIC STATUS WHEN  
REQUIRED IN CONSTRUCTION AGREEMENT WITH YOU**

This endorsement modifies insurance provided under the following:

**COMMERCIAL GENERAL LIABILITY COVERAGE PART**

**A. Section II – Who Is An Insured** is amended to include as an additional insured any person or organization for whom you are performing operations when you and such person or organization have agreed in writing in a contract or agreement that such person or organization be added as an additional insured on your policy. Such person or organization is an additional insured only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:

1. Your acts or omissions; or
2. The acts or omissions of those acting on your behalf;

in the performance of your ongoing operations for the additional insured.

However, the insurance afforded to such additional insured:

1. Only applies to the extent permitted by law; and
2. Will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

A person's or organization's status as an additional insured under this endorsement ends when your operations for that additional insured are completed.

**B. With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:**

This insurance does not apply to:

1. "Bodily injury", "property damage" or "personal and advertising injury" arising out of the rendering of, or the failure to render, any professional architectural, engineering or surveying services, including:
  - a. The preparing, approving, or failing to prepare or approve, maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; or
  - b. Supervisory, inspection, architectural or engineering activities.

This exclusion applies even if the claims against any insured allege negligence or other wrongdoing in the supervision, hiring, employment, training or monitoring of others by that insured, if the "occurrence" which caused the "bodily injury" or "property damage", or the offense which caused the "personal and advertising injury", involved the rendering of or the failure to render any professional architectural, engineering or surveying services.

2. "Bodily injury" or "property damage" occurring after:

- a. All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or
- b. That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

C. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

The most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement you have entered into with the additional insured; or
2. Available under the applicable Limits of Insurance shown in the Declarations;

whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.**

**ADDITIONAL INSURED – OWNERS, LESSEES OR CONTRACTORS – COMPLETED OPERATIONS**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART  
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

**SCHEDULE**

Name Of Additional Insured Person(s) Or Organization(s)	Location And Description Of Completed Operations
BLNKET AS REQUIRED BY WRITTEN CONTRACT.	BLANKET AS REQUIRED BY WRITTEN CONTRACT.

Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

**A. Section II – Who Is An Insured** is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury" or "property damage" caused, in whole or in part, by "your work" at the location designated and described in the Schedule of this endorsement performed for that additional insured and included in the "products-completed operations hazard".

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and
2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

**B. With respect to the insurance afforded to these additional insureds, the following is added to Section III – Limits Of Insurance:**

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or
2. Available under the applicable Limits of Insurance shown in the Declarations;

whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.



**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.**

**PRIMARY AND NONCONTRIBUTORY –  
OTHER INSURANCE CONDITION**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART  
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

The following is added to the **Other Insurance** Condition and supersedes any provision to the contrary:

**Primary And Noncontributory Insurance**

This insurance is primary to and will not seek contribution from any other insurance available to an additional insured under your policy provided that:

(1) The additional insured is a Named Insured under such other insurance; and

(2) You have agreed in writing in a contract or agreement that this insurance would be primary and would not seek contribution from any other insurance available to the additional insured.

A.M. Best Rating Services

Wesco Insurance Company 

A.M. Best #: 002468 NAIC #: 25011 FEIN #: 650165753

Administrative Office  
59 Maiden Lane 6th Floor  
New York, NY 10038  
United States

[View Additional Address Information](#)



Assigned to insurance companies that have, in our opinion, an excellent ability to meet their ongoing insurance obligations.

Web: [www.amtrustgroup.com](http://www.amtrustgroup.com)  
Phone: 212-220-7120  
Fax: 212-220-7130

View additional [news](#), [reports](#) and [products](#) for this company.

Based on A.M. Best's analysis, [051002 - AmTrust Financial Services, Inc](#) is the AMB Ultimate Parent and identifies the topmost entity of the corporate structure. View a list of [operating insurance entities](#) in this structure.

**Best's Credit Ratings**

**Financial Strength Rating [View Definition](#)**

Rating:	A (Excellent)
Affiliation Code:	g (Group)
Financial Size Category:	XIV (\$1.5 Billion to \$2 Billion)
Outlook:	Stable
Action:	Affirmed
Effective Date:	July 08, 2016
Initial Rating Date:	June 30, 1964

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**Long-Term Issuer Credit Rating [View Definition](#)**


Long-Term:	a
Outlook:	Stable
Action:	Affirmed
Effective Date:	July 08, 2016
Initial Rating Date:	June 22, 2005


u Denotes [Under Review Best's Rating](#)

**Best's Credit Rating Analyst**

Rating issued by: A.M. Best Rating Services, Inc.  
Director: Jennifer Marshall, CPCU, ARM  
Senior Director: Michael J. Lagomarsino, CFA, FRM

**Disclosure Information**

 [View A.M. Best's Rating Disclosure Form](#)

 [A.M. Best Affirms Ratings of AmTrust Financial Services, Inc. and Its Subsidiaries](#)  
July 08, 2016

**Rating History**

A.M. Best has provided ratings & analysis on this company since 1964.

**Financial Strength Rating**

Effective Date	Rating
7/8/2016	A
5/29/2015	A
5/30/2014	A
5/24/2013	A
5/29/2012	A

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**Long-Term Issuer Credit Rating**

Effective Date	Rating
7/8/2016	a
5/29/2015	a
5/30/2014	a
5/24/2013	a
5/29/2012	a

**AMB Credit Reports**

<http://www3.ambest.com/ratings/entities/SearchResults.aspx?SR=1>

A.M. Best Rating Services

ACE American Insurance Company (A)

A.M. Best #: 002257 NAIC #: 22667 FEIN #: 852371728

Mailing Address  
P.O. Box 1000  
Philadelphia, PA 19106  
United States

[View Additional Address Information](#)

Web: [www.aceusa.com](http://www.aceusa.com)  
Phone: 215-640-1000



Assigned to insurance companies that have, in our opinion, a superior ability to meet their ongoing insurance obligations.

View additional [news, reports and products](#) for this company.

Based on A.M. Best's analysis, [058303 - Chubb Limited](#) is the AMB Ultimate Parent and identifies the topmost entity of the corporate structure. View a list of [operating insurance entities](#) in this structure.

**Best's Credit Ratings**

**Financial Strength Rating [View Definition](#)**

Rating: A++ (Superior)  
Affiliation Code: g (Group)  
Financial Size Category: XV (\$2 Billion or greater)  
Outlook: Stable  
Action: Affirmed  
Effective Date: June 22, 2016  
Initial Rating Date: June 30, 1951

**Long-Term Issuer Credit Rating [View Definition](#)**

Long-Term: aa+  
Outlook: Stable  
Action: Affirmed  
Effective Date: June 22, 2016  
Initial Rating Date: August 18, 2005

u Denotes Under Review Best's Rating

**Best's Credit Rating Analyst**

Rating issued by: A.M. Best Rating Services, Inc.  
Senior Financial Analyst: Darlan Ryan  
Director: Jennifer Marshall, CPCU, ARM

**Disclosure Information**



[View A.M. Best's Rating Disclosure Form.](#)



[A.M. Best Removes From Under Review and Affirms Ratings of Chubb Limited and Most of Its Subsidiaries.](#)  
June 22, 2016

**Rating History**

A.M. Best has provided ratings & analysis on this company since 1951.

**Financial Strength Rating**

Effective Date	Rating
6/22/2016	A++
7/2/2015	A++u
4/30/2015	A++
4/11/2014	A++
6/14/2013	A+
6/12/2012	A+

**Long-Term Issuer Credit Rating**

Effective Date	Rating
6/22/2016	aa+
7/2/2015	aa+ u
4/30/2015	aa+
4/11/2014	aa+
6/14/2013	aa
6/12/2012	aa



A.M. Best Rating Services

**AGCS Marine Insurance Company** 

A.M. Best #: 002268 NAIC #: 22837 FEIN #: 36503355

**Domiciliary Address**  
 225 W. Washington Street Suite 1800  
 Chicago, IL 60606-3484  
 United States

Web: [www.agcs.allianz.com](http://www.agcs.allianz.com)  
 Phone: 312-224-3300  
 Fax: 312-641-3797



Assigned to insurance companies that have, in our opinion, a superior ability to meet their ongoing insurance obligations.

View additional [news, reports and products](#) for this company.

Based on A.M. Best's analysis, [085449 - Allianz SE](#) is the AMB Ultimate Parent and identifies the topmost entity of the corporate structure. View a list of [operating insurance entities](#) in this structure.

**Best's Credit Ratings**

**Financial Strength Rating [View Definition](#)**

Rating:	A+ (Superior)
Affiliation Code:	g (Group)
Financial Size Category:	XV (\$2 Billion or greater)
Outlook:	Stable
Action:	Affirmed
Effective Date:	August 11, 2016
Initial Rating Date:	June 30, 1982

**Long-Term Issuer Credit Rating [View Definition](#)**

Long-Term:	aa-
Outlook:	Positive
Action:	Affirmed
Effective Date:	August 11, 2016
Initial Rating Date:	July 22, 2005

u Denotes Under Review Best's Rating

**Best's Credit Rating Analyst**

Rating issued by: A.M. Best Rating Services, Inc.  
 Senior Financial Analyst: Adrienne Tortoriello  
 Senior Director: Gregory T. Williams

**Disclosure Information**



View A.M. Best's [Rating Disclosure Form](#)



[A.M. Best Revises Issuer Credit Rating Outlook to Positive for Allianz SE and Most of Its Subsidiaries](#)  
 August 11, 2016

**Rating History**

A.M. Best has provided ratings & analysis on this company since 1982.

**Financial Strength Rating**

Effective Date	Rating
8/11/2016	A+
8/6/2015	A+
7/18/2014	A+
7/10/2013	A+
8/8/2012	A+
12/19/2011	A+ U

**Long-Term Issuer Credit Rating**

Effective Date	Rating
8/11/2016	aa-
8/6/2015	aa-
7/18/2014	aa-
7/10/2013	aa-
8/8/2012	aa-
12/19/2011	aa- U



**New York State Insurance Fund**

*Workers' Compensation & Disability Benefits Specialists Since 1914*

199 CHURCH STREET, NEW YORK, N.Y. 10007-1100

**CERTIFICATE OF WORKERS' COMPENSATION INSURANCE**

\*\*\*\*\* 161607770  
H & K SERVICES INC  
P.O. BOX 12  
12025 LEON ROAD  
LEON NY 14751



Scan to Validate

**POLICYHOLDER**  
H & K SERVICES INC  
P.O. BOX 12  
12025 LEON ROAD  
LEON NY 14751

**CERTIFICATE HOLDER**  
ERIE COUNTY WATER AUTHORITY  
295 MAIN ST, SUITE 350  
BUFFALO NY 14203

<b>POLICY NUMBER</b> G1305 314-5	<b>CERTIFICATE NUMBER</b> 824472	<b>POLICY PERIOD</b> 04/01/2016 TO 04/01/2017	<b>DATE</b> 11/11/2016
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THIS IS TO CERTIFY THAT THE POLICYHOLDER NAMED ABOVE IS INSURED WITH THE NEW YORK STATE INSURANCE FUND UNDER POLICY NO. 1305 314-5, COVERING THE ENTIRE OBLIGATION OF THIS POLICYHOLDER FOR WORKERS' COMPENSATION UNDER THE NEW YORK WORKERS' COMPENSATION LAW WITH RESPECT TO ALL OPERATIONS IN THE STATE OF NEW YORK, EXCEPT AS INDICATED BELOW, AND, WITH RESPECT TO OPERATIONS OUTSIDE OF NEW YORK, TO THE POLICYHOLDER'S REGULAR NEW YORK STATE EMPLOYEES ONLY.

IF YOU WISH TO RECEIVE NOTIFICATIONS REGARDING SAID POLICY, INCLUDING ANY NOTIFICATION OF CANCELLATIONS, OR TO VALIDATE THIS CERTIFICATE, VISIT OUR WEBSITE AT [HTTPS://WWW.NYSIF.COM/CERT/CERTVAL.ASP](https://www.nysif.com/cert/certval.asp). THE NEW YORK STATE INSURANCE FUND IS NOT LIABLE IN THE EVENT OF FAILURE TO GIVE SUCH NOTIFICATIONS.

THIS POLICY DOES NOT COVER CLAIMS OR SUITS THAT ARISE FROM BODILY INJURY SUFFERED BY THE OFFICERS OF THE INSURED CORPORATION.

SCOT HIRSCHMAN - PRESIDENT  
KURT HIRSCHMAN - VICE PRESIDENT

THE POLICY INCLUDES A WAIVER OF SUBROGATION ENDORSEMENT UNDER WHICH NYSIF AGREES TO WAIVE ITS RIGHT OF SUBROGATION TO BRING AN ACTION AGAINST THE CERTIFICATE HOLDER TO RECOVER AMOUNTS WE PAID IN WORKERS' COMPENSATION AND/OR MEDICAL BENEFITS TO OR ON BEHALF OF AN EMPLOYEE OF OUR INSURED IN THE EVENT THAT, PRIOR TO THE DATE OF THE ACCIDENT, THE CERTIFICATE HOLDER HAS ENTERED INTO A WRITTEN CONTRACT WITH OUR INSURED THAT REQUIRES THAT SUCH RIGHT OF SUBROGATION BE WAIVED.

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS NOR INSURANCE COVERAGE UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICY.

BY CAUSING THIS CERTIFICATE TO BE ISSUED TO THE CERTIFICATE HOLDER, THE POLICYHOLDER OR ITS REPRESENTATIVE UNDERTAKES TO PROVIDE THE CERTIFICATE HOLDER 30 CALENDAR DAYS' NOTICE OF ANY CANCELLATION OF THE POLICY.

**APPROVED DEC 08 2016**



NEW YORK STATE INSURANCE FUND

DIRECTOR, INSURANCE FUND UNDERWRITING

VALIDATION NUMBER: 123019753



**Workers' Compensation Board**

**CERTIFICATE OF INSURANCE COVERAGE UNDER THE NYS DISABILITY BENEFITS LAW**

**PART 1. To be completed by Disability Benefits Carrier or Licensed Insurance Agent of that Carrier**

<p>1a. Legal Name and Address of Insured (Use street address only)  <b>H &amp; K SERVICES INC</b></p> <p>12025 LEON ROAD          LEON, NY 14751</p>	<p>1b. Business Telephone Number of Insured          716-296-5290</p> <p>1c. NYS Unemployment Insurance Employer Registration Number of Insured          4589119</p> <p>1d. Federal Employer Identification Number of Insured or Social Security Number          161607770</p>
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<p>2. Name and Address of the Entity requesting Proof of Coverage (Entity being listed as the Certificate Holder)  <b>ERIE COUNTY WATER AUTHORITY</b></p> <p>295 MAIN ST, SUITE 350          BUFFALO NY 14203</p> <p>ATTN: ANTHONY ALESSI</p>	<p>3a. Name of Insurance Carrier  <b>ShelterPoint Life Insurance Company</b></p> <p>3b. Policy Number of Entity listed in box "1a":          DBL169807</p> <p>3c. Policy effective period:          09/24/2016 to 09/23/2017</p> <p style="text-align: right; font-size: 1.2em;">09877 81434 A-VII</p>
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4. Policy covers:

a.  All of the employer's employees eligible under the New York Disability Benefits Law.

b.  Only the following class or classes of the employer's employees:

Under penalty of perjury, I certify that I am an authorized representative or licensed agent of the insurance carrier referenced above and that the named insured has NYS Disability Benefits insurance coverage as described above.

Date Signed 11/11/2016 By *Richard A. Witt*  
(Signature of insurance carrier's authorized representative or NYS Licensed Insurance Agent of that insurance carrier)

Telephone Number 516-829-8100 Title Chief Executive Officer

**IMPORTANT:** If box "4a" is checked, and this form is signed by the insurance carrier's authorized representative or NYS Licensed Insurance Agent of that carrier, this certificate is COMPLETE. Mail it directly to the certificate holder.  
 If box "4b" is checked, this certificate is NOT COMPLETE for the purposes of Section 220, Subd. 8 of the Disability Benefits Law. It must be mailed for completion to the Worker's Compensation Board, DB Plans Acceptance Unit, 328 State Street, Schenectady, NY 12305.

**PART 2. To be completed by NYS Worker's Compensation Board (Only if box "4b" of Part 1 has been checked)**

**State of New York  
 Worker's Compensation Board**

According to information maintained by the NYS Worker's Compensation Board, the above-named employer has complied with the NYS Disability Benefits Law with respect to all of his/her employees.

Date Signed \_\_\_\_\_ By \_\_\_\_\_  
(Signature of NYS Worker's Compensation Board Employee)

Telephone Number \_\_\_\_\_ Title \_\_\_\_\_

Please Note: Only insurance carriers licensed to write NYS Disability Benefits insurance policies and NYS Licensed Insurance Agents of those insurance carriers are authorized to issue Form DB-120.1. Insurance brokers are NOT authorized to issue this form.

APPROVED DEC 08 2016

## Additional Instructions for Form DB-120.1

By signing this form, the insurance carrier identified in box "3" on this form is certifying that it is insuring the business referenced in box "1a" for disability benefits under the New York State Disability Benefits Law. The Insurance Carrier or its licensed agent will send this Certificate of Insurance to the entity listed as the certificate holder in box "2".

Will the carrier notify the certificate holder within 10 days of a policy being cancelled for non-payment of premium or within 30 days if cancelled for any other reason or if the insured is otherwise eliminated from the coverage indicated on this certificate prior to the end of the policy effective period?  YES  NO

This certificate is issued as a matter of information only and confers no rights upon the certificate holder. This certificate does not amend, extend or alter the coverage afforded by the policy listed, nor does it confer any rights or responsibilities beyond those contained in the referenced policy.

This certificate may be used as evidence of a Disability Benefits contract of insurance only while the underlying policy is in effect.

**Please Note: Upon the cancellation of the disability benefits policy indicated on this form, if the business continues to be named on a permit, license or contract issued by a certificate holder, the business must provide that certificate holder with a new Certificate of NYS Disability Benefits Coverage or other authorized proof that the business is complying with the mandatory coverage requirements of the New York State Disability Benefits Law.**

### DISABILITY BENEFITS LAW

#### §220. Subd. 8

(a) The head of a state or municipal department, board, commission or office authorized or required by law to issue any permit for or in connection with any work involving the employment of employees in employment as defined in this article, and notwithstanding any general or special statute requiring or authorizing the issue of such permits, shall not issue such permit unless proof duly subscribed by an insurance carrier is produced in a form satisfactory to the chair, that the payment of disability benefits for all employees has been secured as provided by this article. Nothing herein, however, shall be construed as creating any liability on the part of such state or municipal department, board, commission or office to pay any disability benefits to any such employee if so employed.

(b) The head of a state or municipal department, board, commission or office authorized or required by law to enter into any contract for or in connection with any work involving the employment of employees in employment as defined in this article and notwithstanding any general or special statute requiring or authorizing any such contract, shall not enter into any such contract unless proof duly subscribed by an insurance carrier is produced in a form satisfactory to the chair, that the payment of disability benefits for all employees has been secured as provided by this article.



A.M. Best Rating Services

ShelterPoint Life Insurance Company (2)

A.M. Best #: 009877 NAIC #: 61434 FEIN #: 112294118

Domiciliary Address  
600 Northern Boulevard Suite 310  
Great Neck, NY 11021-5202  
United States

Web: [www.shelterpoint.com](http://www.shelterpoint.com)  
Phone: 516-829-8100  
Fax: 516-504-8412



Assigned to insurance companies that have, in our opinion, an excellent ability to meet their ongoing insurance obligations.

View additional [news, reports and products](#) for this company.

Based on A.M. Best's analysis, 055780 - ShelterPoint Group, Inc. is the AMB Ultimate Parent and identifies the topmost entity of the corporate structure. View a list of [operating insurance entities](#) in this structure.

**Best's Credit Ratings**

**Financial Strength Rating View Definition**

Rating:	A- (Excellent)
Financial Size Category:	VII (\$50 Million to \$100 Million)
Outlook:	Stable
Action:	Affirmed
Effective Date:	August 25, 2016
Initial Rating Date:	June 30, 1990

**Long-Term Issuer Credit Rating View Definition**

Long-Term:	a-
Outlook:	Stable
Action:	Affirmed
Effective Date:	August 25, 2016
Initial Rating Date:	June 28, 2007

u Denotes Under Review Best's Rating

**Best's Credit Rating Analyst**

Rating issued by: A.M. Best Rating Services, Inc.  
Senior Financial Analyst: Kathryn Steffanelli  
Director: Joseph R. Zazzera

**Disclosure Information**



View A.M. Best's [Rating Disclosure Form](#)

**Rating History**

A.M. Best has provided ratings & analysis on this company since 1990.

**Financial Strength Rating**

Effective Date	Rating
8/25/2016	A-
9/11/2015	A-
11/20/2014	A-
8/29/2014	A-
9/25/2013	A-
9/28/2012	A-
8/21/2011	A-

**Long-Term Issuer Credit Rating**

Effective Date	Rating
8/25/2016	a-
9/11/2015	a-
11/20/2014	a-
8/29/2014	a-
9/25/2013	a-
8/28/2012	a-
8/21/2011	a-

**Erie County Water Authority Insurance Requirements for Contracting Services**

**Project Number:** 201500169

**Description:** OBG-12A Sturgeon Point and VanDeWater Improvements Project.

The following minimum insurance requirements shall apply to contractors providing services to the Erie County Water Authority (ECWA). If a service or project, in the opinion of ECWA, represents an unusual or exceptional risk, ECWA 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.

An **X** indicates insurance coverage is required.

**X Commercial General Liability Insurance:** (including, but not limited to, Bodily (Personal) Injury, Premises Operations, Property Damage Liability (broad form), Contractual Liability, Advertising Injury, Independent Contractors, Product Liability, Completed Operations Liability and Explosion, Collapse and Underground Coverage) – in an amount not less than \$1,000,000 combined single limit and \$2,000,000 in the aggregate:

     Per Policy

**X** Per Project or Job

     Per Location

There should be no exclusions for any claims filed, actual or alleged, for violation of any applicable statute including, but not limited to, the New York State or federal labor laws, ordinances, administrative orders, executive orders, rules, regulations, or decrees of any court of competent jurisdiction.

**X Commercial Business Automobile Insurance** in an amount of not less than \$1,000,000 each accident and shall cover liability arising out of any automobile owned, leased, hired, borrowed and non-owned automobiles. Additionally, if vehicles are used for transporting hazardous materials, the contractor shall obtain and maintain the "broadened" coverage (endorsement CA 99 48), as well as proof of MCS 90 04 00.

X **Excess Umbrella Liability Insurance** in an amount of not less than:

\$1,000,000 in the aggregate

\$2,000,000 in the aggregate

\$3,000,000 in the aggregate

\$4,000,000 in the aggregate

\$5,000,000 in the aggregate

Per Policy

Per Project or Job

Per Location

X **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.**

X **Pollution Legal Liability Insurance** in an amount of not less than:

\$1,000,000 in the aggregate

\$2,000,000 in the aggregate

\$3,000,000 in the aggregate

\$4,000,000 in the aggregate

\$5,000,000 in the aggregate

Per Policy

Per Project or Job

Per Location

And, if disposal of materials is involved, the disposal site operator must carry

Pollution Legal Liability Insurance in an amount of not less than:

\$1,000,000 in the aggregate

\$2,000,000 in the aggregate

\$3,000,000 in the aggregate

\$4,000,000 in the aggregate

\$5,000,000 in the aggregate

Per Policy

Per Project or Job

Per Location

**Workers' Compensation and Employers' Liability and New York State Disability Benefits Insurances**, as required by New York State statute. If employees of the contractor will be working on or near navigable waters, US Longshore and Harbor Workers Compensation Act endorsement must be included.

Certificates of Insurance, on forms approved by the New York State Department of Insurance, must be submitted to ECWA 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 ECWA 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 ECWA 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 ECWA, 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.

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 ECWA shall not be construed to relieve the outside vendor of any obligations, responsibilities or liabilities.

Certificates of Insurance should be e-mailed to [AALESSI@ECWA.ORG](mailto:AALESSI@ECWA.ORG), or mailed to Mr. Anthony Alessi, ECWA Claims 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 Mr. Alessi by e-mail or phone (716) 849-8477.

Please refer to the bid and the contract document(s) for additional information regarding insurance requirements.



# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)  
11/29/2016

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

**IMPORTANT:** If the certificate holder is an ADDITIONAL INSURED, the policy(les) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

<b>PRODUCER</b> First Niagara Risk Management, Inc 726 Exchange Street Suite 900  Buffalo NY 14210		<b>CONTACT NAME:</b> Amy Roberts <b>PHONE (A/C, No, Ext):</b> (716) 819-5500 <b>FAX (A/C, No):</b> (716) 819-5140 <b>E-MAIL ADDRESS:</b> Amy.Roberts@fnrm.com	
<b>INSURED</b> Arric Corp 5033 Transit Road  Depew NY 14043		<b>INSURER(S) AFFORDING COVERAGE</b> INSURER A: Great Divide Insurance Company NAIC # 25224 INSURER B: INSURER C: INSURER D: INSURER E: INSURER F:	

**COVERAGES** CERTIFICATE NUMBER: 16-17 LAEW REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	<input checked="" type="checkbox"/> <b>COMMERCIAL GENERAL LIABILITY</b> <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> <b>Contractual Included</b> <input checked="" type="checkbox"/> <b>Asbestos/Lead Abatement</b> GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:	X	Y	11231 25224 A+ XV ECPO152972716 X, C, U Included	11/1/2016	11/1/2017	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 100,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 2,000,000 Employee Benefits \$ 1,000,000
A	<b>AUTOMOBILE LIABILITY</b> <input type="checkbox"/> ANY AUTO ALL OWNED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS <input checked="" type="checkbox"/> SCHEDULED AUTOS NON-OWNED AUTOS	X	Y	11231 25224 A+ XV BAP152972916	11/1/2016	11/1/2017	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ Uninsured motorist combined \$ 1,000,000
A	<input checked="" type="checkbox"/> <b>UMBRELLA LIAB</b> <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> <b>EXCESS LIAB</b> <input type="checkbox"/> CLAIMS-MADE DED RETENTION \$	X	Y	FFKL52973016 Pollution/Asbestos is not excluded under the policy	11/1/2016	11/1/2017	EACH OCCURRENCE \$ 10,000,000 AGGREGATE \$ 10,000,000
A	<b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b> ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N	N/A	WCA152972816	11/1/2016	11/1/2017	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER EL. EACH ACCIDENT \$ 1,000,000 EL. DISEASE - EA EMPLOYEE \$ 1,000,000 EL. DISEASE - POLICY LIMIT \$ 1,000,000
A	<b>Pollution (incl Asbestos and Lead Abatement)</b>			ECPO152972716 11231 25224 A+ XV	11/1/2016	11/1/2017	Each Occurrence \$1,000,000 General Aggregate \$1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)  
 Project: 201500169 OBG-12-A Sturgeon Point and VanDeWater Improvements  
 Erie County Water Authority, its officers, agents and employees  
 see attached acord 101  
 Project # 201500169 APPROVED DEC 08 2016

<b>CERTIFICATE HOLDER</b>  Erie County Water Authority attn: Anthony Alessi 295 Main St., Suite 350 Buffalo, NY 14203	<b>CANCELLATION</b>  SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.  AUTHORIZED REPRESENTATIVE M Bonetto/KBONET
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**ADDITIONAL REMARKS SCHEDULE**

AGENCY First Niagara Risk Management, Inc		NAMED INSURED Arric Corp	
POLICY NUMBER See Page 1		5033 Transit Road Depew, NY 14043	
CARRIER See Page 1	NAIC CODE	EFFECTIVE DATE: See Page 1	

**ADDITIONAL REMARKS**

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,  
 FORM NUMBER: 25 FORM TITLE: Certificate of Liability Insurance

To the extent covered by form(s):

**Auto:**

- CA0444 10/2013 - Waiver of Transfer of Rights of Recovery Against Others to Us (Waiver of Subrogation)
- CA0001 10/2013 - Business Auto Coverage Form
- CA2223 04/18 - Business Auto - Additional Insured When Required by Contract or Agreement

**General Liability:**

- ENV2004 09/06 - Waiver of Subrogation
- ECP1004 04/10 - Additional Insured - Blanket
- ECP1005 04/10 - Additional Insured - Scheduled Person or Organization

**Excess/Umbrella:**

- FFX8000 10/06 - Excess Liability Insurance Policy

**Workers Compensation:**

- WC000313 4/84 - Waiver of Our Right to Recover From Others Endorsement

**Inland Marine:**

- CB4215 01/11 - Contractor's Equipment Plus Endorsement

APPROVED DEC 08 2016

## ENDORSEMENT

This endorsement forms a part of the policy to which it is attached. Please read it carefully.

### ADDITIONAL INSURED – COVERAGE A, B & D – SCHEDULED PERSON OR ORGANIZATION

This endorsement modifies insurance provided under the following:

#### ENVIRONMENTAL COMBINED POLICY

In consideration of the premium charged and notwithstanding anything contained in the policy to the contrary, it is hereby agreed and understood that this endorsement shall apply only to the Coverage Part(s) corresponding with the box or boxes marked below.

COVERAGE A AND B – GENERAL LIABILITY

APPROVED DEC 0 8 2016

COVERAGE D – CONTRACTORS POLLUTION LIABILITY

#### SCHEDULE

**Name of Person or Organization:**

Erie County Water Authority  
Attn: Anthony Alessi

**Job Description/Location:**

295 Main St., Suite 350  
Buffalo, NY 14203

**SECTION III – WHO IS AN INSURED** is amended to include as an insured, with respect to Coverage A, B and D, any person(s) or organization(s) shown in the schedule above.

Such additional insured status applies only:

1. Under **COVERAGE A BODILY INJURY AND PROPERTY DAMAGE LIABILITY** and **COVERAGE B PERSONAL AND ADVERTISING INJURY LIABILITY** for claims or suits resulting from:
  - a. Your work performed for such person(s) or organization(s) in the performance of your ongoing operations for the additional insured; or
  - b. Your work performed for such person(s) or organization(s) and included in the **products-completed operations hazard**.
2. Under **COVERAGE D CONTRACTORS POLLUTION LIABILITY** for claims or suits arising out of out **pollution conditions** that are the results of:
  - a. Your work performed for such person(s) or organization(s) in the performance of your ongoing operations for the additional insured; or
  - b. Your work performed for such person(s) or organization(s) and included in the **products-completed operations hazard**.

With respect to damages caused by **your work**, as described above, the coverage provided hereunder shall be primary and not contributing with any other insurance available to those person(s) or organization(s) shown in the schedule above.

**ALL OTHER TERMS AND CONDITIONS OF THE POLICY SHALL APPLY AND REMAIN UNCHANGED.**

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## ENDORSEMENT

This endorsement forms a part of the policy to which it is attached. Please read it carefully.

### **BUSINESS AUTO - ADDITIONAL INSURED WHEN REQUIRED BY CONTRACT OR AGREEMENT**

This endorsement modifies insurance provided under the following:

#### **BUSINESS AUTO COVERAGE FORM**

Section II – Liability Coverage A. – Coverage, 1. Who is an Insured, is amended to add:

- d. Any person or organization to whom you become obligated to include as an additional insured under this policy, as a result of any contract or agreement you enter into, excluding contracts or agreements for professional services, which requires you to furnish insurance to that person or organization of the type provided by this policy, but only with respect to liability arising out of your operations or premises owned by or rented to you. However, the insurance provided will not exceed the lesser of:
1. The coverage and/or limits of this policy; or
  2. The coverage and/or limits required by said contract or agreement.

**ALL OTHER TERMS AND CONDITIONS OF THE POLICY SHALL APPLY AND REMAIN UNCHANGED.**

## BUSINESS AUTO COVERAGE FORM

Various provisions in this policy restrict coverage. Read the entire policy carefully to determine rights, duties and what is and is not covered.

Throughout this policy the words "you" and "your" refer to the Named Insured shown in the Declarations. The words "we", "us" and "our" refer to the company providing this insurance.

Other words and phrases that appear in quotation marks have special meaning. Refer to Section V - Definitions.

### SECTION I - COVERED AUTOS

Item Two of the Declarations shows the "autos" that are covered "autos" for each of your coverages. The following numerical symbols describe the "autos" that may be covered "autos". The symbols entered next to a coverage on the Declarations designate the only "autos" that are covered "autos".

#### A. Description Of Covered Auto Designation Symbols

Symbol	Description Of Covered Auto Designation Symbols	
1	Any "Auto"	
2	Owned "Autos" Only	Only those "autos" you own (and for Covered Autos Liability Coverage any "trailers" you don't own while attached to power units you own). This includes those "autos" you acquire ownership of after the policy begins.
3	Owned Private Passenger "Autos" Only	Only the private passenger "autos" you own. This includes those private passenger "autos" you acquire ownership of after the policy begins.
4	Owned "Autos" Other Than Private Passenger "Autos" Only	Only those "autos" you own that are not of the private passenger type (and for Covered Autos Liability Coverage any "trailers" you don't own while attached to power units you own). This includes those "autos" not of the private passenger type you acquire ownership of after the policy begins.
5	Owned "Autos" Subject To No-fault	Only those "autos" you own that are required to have no-fault benefits in the state where they are licensed or principally garaged. This includes those "autos" you acquire ownership of after the policy begins provided they are required to have no-fault benefits in the state where they are licensed or principally garaged.
6	Owned "Autos" Subject To A Compulsory Uninsured Motorists Law	Only those "autos" you own that because of the law in the state where they are licensed or principally garaged are required to have and cannot reject Uninsured Motorists Coverage. This includes those "autos" you acquire ownership of after the policy begins provided they are subject to the same state uninsured motorists requirement.
7	Specifically Described "Autos"	Only those "autos" described in Item Three of the Declarations for which a premium charge is shown (and for Covered Autos Liability Coverage any "trailers" you don't own while attached to any power unit described in Item Three).
8	Hired "Autos" Only	Only those "autos" you lease, hire, rent or borrow. This does not include any "auto" you lease, hire, rent or borrow from any of your "employees", partners (if you are a partnership), members (if you are a limited liability company) or members of their households.
9	Non-owned "Autos" Only	Only those "autos" you do not own, lease, hire, rent or borrow that are used in connection with your business. This includes "autos" owned by your "employees", partners (if you are a partnership), members (if you are a limited liability company) or members of their households but only while used in your business or your personal affairs.

19	Mobile Equipment Subject To Compulsory Or Financial Responsibility Or Other Motor Vehicle Insurance Law Only	Only those "autos" that are land vehicles and that would qualify under the definition of "mobile equipment" under this policy if they were not subject to a compulsory or financial responsibility law or other motor vehicle insurance law where they are licensed or principally garaged.
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**B. Owned Autos You Acquire After The Policy Begins**

1. If Symbols 1, 2, 3, 4, 5, 6 or 19 are entered next to a coverage in Item Two of the Declarations, then you have coverage for "autos" that you acquire of the type described for the remainder of the policy period.
2. But, if Symbol 7 is entered next to a coverage in Item Two of the Declarations, an "auto" you acquire will be a covered "auto" for that coverage only if:
  - a. We already cover all "autos" that you own for that coverage or it replaces an "auto" you previously owned that had that coverage; and
  - b. You tell us within 30 days after you acquire it that you want us to cover it for that coverage.

**C. Certain Trailers, Mobile Equipment And Temporary Substitute Autos**

If Covered Autos Liability Coverage is provided by this Coverage Form, the following types of vehicles are also covered "autos" for Covered Autos Liability Coverage:

1. "Trailers" with a load capacity of 2,000 pounds or less designed primarily for travel on public roads.
2. "Mobile equipment" while being carried or towed by a covered "auto".
3. Any "auto" you do not own while used with the permission of its owner as a temporary substitute for a covered "auto" you own that is out of service because of its:
  - a. Breakdown;
  - b. Repair;
  - c. Servicing;
  - d. "Loss"; or
  - e. Destruction.

**SECTION II - COVERED AUTOS LIABILITY COVERAGE**

**A. Coverage**

We will pay all sums an "insured" legally must pay as damages because of "bodily injury" or "property damage" to which this insurance applies, caused by an "accident" and resulting from the ownership, maintenance or use of a covered "auto".

We will also pay all sums an "insured" legally must pay as a "covered pollution cost or expense" to which this insurance applies, caused by an "accident" and resulting from the ownership, maintenance or use of covered "autos". However, we will only pay for the "covered pollution cost or expense" if there is either "bodily injury" or "property damage" to which this insurance applies that is caused by the same "accident".

We have the right and duty to defend any "insured" against a "suit" asking for such damages or a "covered pollution cost or expense". However, we have no duty to defend any "insured" against a "suit" seeking damages for "bodily injury" or "property damage" or a "covered pollution cost or expense" to which this insurance does not apply. We may investigate and settle any claim or "suit" as we consider appropriate. Our duty to defend or settle ends when the Covered Autos Liability Coverage Limit of insurance has been exhausted by payment of judgments or settlements.

**1. Who is An Insured**

The following are "insureds":

- a. You for any covered "auto".
- b. Anyone else while using with your permission a covered "auto" you own, hire or borrow except:

- (1) The owner or anyone else from whom you hire or borrow a covered "auto".

This exception does not apply if the covered "auto" is a "trailer" connected to a covered "auto" you own.

- (2) Your "employee" if the covered "auto" is owned by that "employee" or a member of his or her household.
- (3) Someone using a covered "auto" while he or she is working in a business of selling, servicing, repairing, parking or storing "autos" unless that business is yours.
- (4) Anyone other than your "employees", partners (if you are a partnership), members (if you are a limited liability company) or a lessee or borrower or any of their "employees", while moving property to or from a covered "auto".
- (5) A partner (if you are a partnership) or a member (if you are a limited liability company) for a covered "auto" owned by him or her or a member of his or her household.

c. Anyone liable for the conduct of an "insured" described above but only to the extent of that liability.

## 2. Coverage Extensions

### a. Supplementary Payments

We will pay for the "insured":

- (1) All expenses we incur.
- (2) Up to \$2,000 for cost of bail bonds (including bonds for related traffic law violations) required because of an "accident" we cover. We do not have to furnish these bonds.
- (3) The cost of bonds to release attachments in any "suit" against the "insured" we defend, but only for bond amounts within our Limit of Insurance.
- (4) All reasonable expenses incurred by the "insured" at our request, including actual loss of earnings up to \$250 a day because of time off from work.
- (5) All court costs taxed against the "insured" in any "suit" against the "insured" we defend. However, these payments do not include attorneys' fees or attorneys' expenses taxed against the "insured".
- (6) All interest on the full amount of any judgment that accrues after entry of the judgment in any "suit" against the "insured" we defend, but our duty to pay interest ends when we have paid, offered to pay or deposited in court the part of the judgment that is within our Limit of Insurance.

These payments will not reduce the Limit of Insurance.

### b. Out-of-state Coverage Extensions

While a covered "auto" is away from the state where it is licensed, we will:

- (1) Increase the Limit of Insurance for Covered Autos Liability Coverage to meet the limits specified by a compulsory or financial responsibility law of the jurisdiction where the covered "auto" is being used. This extension does not apply to the limit or limits specified by any law governing motor carriers of passengers or property.
- (2) Provide the minimum amounts and types of other coverages, such as no-fault, required of out-of-state vehicles by the jurisdiction where the covered "auto" is being used.

We will not pay anyone more than once for the same elements of loss because of these extensions.

## B. Exclusions

This insurance does not apply to any of the following:

### 1. Expected Or Intended Injury

"Bodily injury" or "property damage" expected or intended from the standpoint of the "insured".

### 2. Contractual

Liability assumed under any contract or agreement.

But this exclusion does not apply to liability for damages:

- a. Assumed in a contract or agreement that is an "insured contract", provided the "bodily injury" or "property damage" occurs subsequent to the execution of the contract or agreement; or
- b. That the "insured" would have in the absence of the contract or agreement.

### 3. Workers' Compensation

Any obligation for which the "insured" or the "insured's" insurer may be held liable under any workers' compensation, disability benefits or unemployment compensation law or any similar law.

**4. Employee Indemnification And Employer's Liability**

"Bodily injury" to:

- a. An "employee" of the "insured" arising out of and in the course of:
  - (1) Employment by the "insured"; or
  - (2) Performing the duties related to the conduct of the "insured's" business; or
- b. The spouse, child, parent, brother or sister of that "employee" as a consequence of Paragraph a. above.

This exclusion applies:

- (1) Whether the "insured" may be liable as an employer or in any other capacity; and
- (2) To any obligation to share damages with or repay someone else who must pay damages because of the injury.

But this exclusion does not apply to "bodily injury" to domestic "employees" not entitled to workers' compensation benefits or to liability assumed by the "insured" under an "insured contract". For the purposes of the Coverage Form, a domestic "employee" is a person engaged in household or domestic work performed principally in connection with a residence premises.

**5. Fellow Employee**

"Bodily injury" to:

- a. Any fellow "employee" of the "insured" arising out of and in the course of the fellow "employee's" employment or while performing duties related to the conduct of your business; or
- b. The spouse, child, parent, brother or sister of that fellow "employee" as a consequence of Paragraph a. above.

**6. Care, Custody Or Control**

"Property damage" to or "covered pollution cost or expense" involving property owned or transported by the "insured" or in the "insured's" care, custody or control. But this exclusion does not apply to liability assumed under a sidetrack agreement.

**7. Handling Of Property**

"Bodily injury" or "property damage" resulting from the handling of property:

- a. Before it is moved from the place where it is accepted by the "insured" for movement into or onto the covered "auto"; or

- b. After it is moved from the covered "auto" to the place where it is finally delivered by the "insured".

**8. Movement Of Property By Mechanical Device**

"Bodily injury" or "property damage" resulting from the movement of property by a mechanical device (other than a hand truck) unless the device is attached to the covered "auto".

**9. Operations**

"Bodily injury" or "property damage" arising out of the operation of:

- a. Any equipment listed in Paragraphs 6.b. and 6.c. of the definition of "mobile equipment"; or
- b. Machinery or equipment that is on, attached to or part of a land vehicle that would qualify under the definition of "mobile equipment" if it were not subject to a compulsory or financial responsibility law or other motor vehicle insurance law where it is licensed or principally garaged.

**10. Completed Operations**

"Bodily injury" or "property damage" arising out of your work after that work has been completed or abandoned.

In this exclusion, your work means:

- a. Work or operations performed by you or on your behalf; and
- b. Materials, parts or equipment furnished in connection with such work or operations.

Your work includes warranties or representations made at any time with respect to the fitness, quality, durability or performance of any of the items included in Paragraph a. or b. above.

Your work will be deemed completed at the earliest of the following times:

- (1) When all of the work called for in your contract has been completed;
- (2) When all of the work to be done at the site has been completed if your contract calls for work at more than one site; or
- (3) When that part of the work done at a job site has been put to its intended use by any person or organization other than another contractor or subcontractor working on the same project.

Work that may need service, maintenance, correction, repair or replacement, but which is otherwise complete, will be treated as completed.

#### 11. Pollution

"Bodily Injury" or "property damage" arising out of the actual, alleged or threatened discharge, dispersal, seepage, migration, release or escape of "pollutants":

- a. That are, or that are contained in any property that is:
  - (1) Being transported or towed by, handled or handled for movement into, onto or from the covered "auto";
  - (2) Otherwise in the course of transit by or on behalf of the "insured"; or
  - (3) Being stored, disposed of, treated or processed in or upon the covered "auto";
- b. Before the "pollutants" or any property in which the "pollutants" are contained are moved from the place where they are accepted by the "insured" for movement into or onto the covered "auto"; or
- c. After the "pollutants" or any property in which the "pollutants" are contained are moved from the covered "auto" to the place where they are finally delivered, disposed of or abandoned by the "insured".

Paragraph a. above does not apply to fuels, lubricants, fluids, exhaust gases or other similar "pollutants" that are needed for or result from the normal electrical, hydraulic or mechanical functioning of the covered "auto" or its parts if:

- (1) The "pollutants" escape, seep, migrate or are discharged; dispersed or released directly from an "auto" part designed by its manufacturer to hold, store, receive or dispose of such "pollutants"; and
- (2) The "bodily injury", "property damage" or "covered pollution cost or expense" does not arise out of the operation of any equipment listed in Paragraphs 6.b. and 6.c. of the definition of "mobile equipment".

Paragraphs b. and c. above of this exclusion do not apply to "accidents" that occur away from premises owned by or rented to an "insured" with respect to "pollutants" not in or upon a covered "auto" if:

- (a) The "pollutants" or any property in which the "pollutants" are contained are upset, overturned or damaged as a result of the maintenance or use of a covered "auto"; and
- (b) The discharge, dispersal, seepage, migration, release or escape of the "pollutants" is caused directly by such upset, overturn or damage.

#### 12. War

"Bodily injury" or "property damage" arising directly or indirectly out of:

- a. War, including undeclared or civil war;
- b. Warlike action by a military force, including action in hindering or defending against an actual or expected attack, by any government, sovereign or other authority using military personnel or other agents; or
- c. Insurrection, rebellion, revolution, usurped power or action taken by governmental authority in hindering or defending against any of these.

#### 13. Racing

Covered "autos" while used in any professional or organized racing or demolition contest or stunting activity, or while practicing for such contest or activity. This insurance also does not apply while that covered "auto" is being prepared for such a contest or activity.

#### C. Limit Of Insurance

Regardless of the number of covered "autos", "insureds", premiums paid, claims made or vehicles involved in the "accident", the most we will pay for the total of all damages and "covered pollution cost or expense" combined resulting from any one "accident" is the Limit Of Insurance for Covered Autos Liability Coverage shown in the Declarations.

All "bodily injury", "property damage" and "covered pollution cost or expense" resulting from continuous or repeated exposure to substantially the same conditions will be considered as resulting from one "accident".

No one will be entitled to receive duplicate payments for the same elements of "loss" under this Coverage Form and any Medical Payments Coverage endorsement, Uninsured Motorists Coverage endorsement or Underinsured Motorists Coverage endorsement attached to this Coverage Part.

### SECTION III - PHYSICAL DAMAGE COVERAGE

#### A. Coverage

1. We will pay for "loss" to a covered "auto" or its equipment under:

##### a. Comprehensive Coverage

From any cause except:

- (1) The covered "auto's" collision with another object; or
- (2) The covered "auto's" overturn.

##### b. Specified Causes Of Loss Coverage

Caused by:

- (1) Fire, lightning or explosion;
- (2) Theft;
- (3) Windstorm, hail or earthquake;
- (4) Flood;
- (5) Mischief or vandalism; or
- (6) The sinking, burning, collision or derailment of any conveyance transporting the covered "auto".

##### c. Collision Coverage

Caused by:

- (1) The covered "auto's" collision with another object; or
- (2) The covered "auto's" overturn.

#### 2. Towing

We will pay up to the limit shown in the Declarations for towing and labor costs incurred each time a covered "auto" of the private passenger type is disabled. However, the labor must be performed at the place of disablement.

#### 3. Glass Breakage - Hitting A Bird Or Animal - Falling Objects Or Missiles

If you carry Comprehensive Coverage for the damaged covered "auto", we will pay for the following under Comprehensive Coverage:

- a. Glass breakage;
- b. "Loss" caused by hitting a bird or animal; and
- c. "Loss" caused by falling objects or missiles.

However, you have the option of having glass breakage caused by a covered "auto's" collision or overturn considered a "loss" under Collision Coverage.

#### 4. Coverage Extensions

##### a. Transportation Expenses

We will pay up to \$20 per day, to a maximum of \$600, for temporary transportation expense incurred by you because of the total theft of a covered "auto" of the private passenger type. We will pay only for those covered "autos" for which you carry either Comprehensive or Specified Causes Of Loss Coverage. We will pay for temporary transportation expenses incurred during the period beginning 48 hours after the theft and ending, regardless of the policy's expiration, when the covered "auto" is returned to use or we pay for its "loss".

##### b. Loss Of Use Expenses

For Hired Auto Physical Damage, we will pay expenses for which an "insured" becomes legally responsible to pay for loss of use of a vehicle rented or hired without a driver under a written rental contract or agreement. We will pay for loss of use expenses if caused by:

- (1) Other than collision only if the Declarations indicates that Comprehensive Coverage is provided for any covered "auto";
- (2) Specified Causes Of Loss only if the Declarations indicates that Specified Causes Of Loss Coverage is provided for any covered "auto"; or

- (3) Collision only if the Declarations indicate that Collision Coverage is provided for any covered "auto".

However, the most we will pay for any expenses for loss of use is \$20 per day, to a maximum of \$600.

#### B. Exclusions

1. We will not pay for "loss" caused by or resulting from any of the following. Such "loss" is excluded regardless of any other cause or event that contributes concurrently or in any sequence to the "loss".

##### a. Nuclear Hazard

- (1) The explosion of any weapon employing atomic fission or fusion; or  
(2) Nuclear reaction or radiation, or radioactive contamination, however caused.

##### b. War Or Military Action

- (1) War, including undeclared or civil war;  
(2) Warlike action by a military force, including action in hindering or defending against an actual or expected attack, by any government, sovereign or other authority using military personnel or other agents; or  
(3) Insurrection, rebellion, revolution, usurped power or action taken by governmental authority in hindering or defending against any of these.

2. We will not pay for "loss" to any covered "auto" while used in any professional or organized racing or demolition contest or stunting activity, or while practicing for such contest or activity. We will also not pay for "loss" to any covered "auto" while that covered "auto" is being prepared for such a contest or activity.

3. We will not pay for "loss" due and confined to:

- a. Wear and tear, freezing, mechanical or electrical breakdown.  
b. Blowouts, punctures or other road damage to tires.

This exclusion does not apply to such "loss" resulting from the total theft of a covered "auto".

4. We will not pay for "loss" to any of the following:

- a. Tapes, records, discs or other similar audio, visual or data electronic devices designed for use with audio, visual or data electronic equipment.

- b. Any device designed or used to detect speed-measuring equipment, such as radar or laser detectors, and any jamming apparatus intended to elude or disrupt speed-measuring equipment.

- c. Any electronic equipment, without regard to whether this equipment is permanently installed; that reproduces, receives or transmits audio, visual or data signals.

- d. Any accessories used with the electronic equipment described in Paragraph c. above.

5. Exclusions 4.c. and 4.d. do not apply to equipment designed to be operated solely by use of the power from the "auto's" electrical system that, at the time of "loss", is:

- a. Permanently installed in or upon the covered "auto";

- b. Removable from a housing unit which is permanently installed in or upon the covered "auto";

- c. An integral part of the same unit housing any electronic equipment described in Paragraphs a. and b. above; or

- d. Necessary for the normal operation of the covered "auto" or the monitoring of the covered "auto's" operating system.

6. We will not pay for "loss" to a covered "auto" due to "diminution in value".

#### C. Limits Of Insurance

1. The most we will pay for:

- a. "Loss" to any one covered "auto" is the lesser of:

- (1) The actual cash value of the damaged or stolen property as of the time of the "loss"; or

- (2) The cost of repairing or replacing the damaged or stolen property with other property of like kind and quality.

- b. All electronic equipment that reproduces, receives or transmits audio, visual or data signals in any one "loss" is \$1,000, if, at the time of "loss", such electronic equipment is:

- (1) Permanently installed in or upon the covered "auto" in a housing, opening or other location that is not normally used by the "auto" manufacturer for the installation of such equipment;



- (2) Removable from a permanently installed housing unit as described in Paragraph b.(1) above; or
  - (3) An integral part of such equipment as described in Paragraphs b.(1) and b.(2) above.
2. An adjustment for depreciation and physical condition will be made in determining actual cash value in the event of a total "loss".
  3. If a repair or replacement results in better than like kind or quality, we will not pay for the amount of the betterment.

**D. Deductible**

For each covered "auto", our obligation to pay for, repair, return or replace damaged or stolen property will be reduced by the applicable deductible shown in the Declarations. Any Comprehensive Coverage deductible shown in the Declarations does not apply to "loss" caused by fire or lightning.

**SECTION IV – BUSINESS AUTO CONDITIONS**

The following conditions apply in addition to the Common Policy Conditions:

**A. Loss Conditions**

**1. Appraisal For Physical Damage Loss**

If you and we disagree on the amount of "loss", either may demand an appraisal of the "loss". In this event, each party will select a competent appraiser. The two appraisers will select a competent and impartial umpire. The appraisers will state separately the actual cash value and amount of "loss". If they fail to agree, they will submit their differences to the umpire. A decision agreed to by any two will be binding. Each party will:

- a. Pay its chosen appraiser, and
- b. Bear the other expenses of the appraisal and umpire equally.

If we submit to an appraisal, we will still retain our right to deny the claim.

**2. Duties In The Event Of Accident, Claim, Suit Or Loss**

We have no duty to provide coverage under this policy unless there has been full compliance with the following duties:

- a. In the event of "accident", claim, "suit" or "loss", you must give us or our authorized representative prompt notice of the "accident" or "loss". Include:

- (1) How, when and where the "accident" or "loss" occurred;

- (2) The "Insured's" name and address; and
- (3) To the extent possible, the names and addresses of any injured persons and witnesses.

**b. Additionally, you and any other involved "insured" must:**

- (1) Assume no obligation, make no payment or incur no expense without our consent, except at the "insured's" own cost.
- (2) Immediately send us copies of any request, demand, order, notice, summons or legal paper received concerning the claim or "suit".
- (3) Cooperate with us in the investigation or settlement of the claim or defense against the "suit".
- (4) Authorize us to obtain medical records or other pertinent information.
- (5) Submit to examination, at our expense, by physicians of our choice, as often as we reasonably require.

**c. If there is "loss" to a covered "auto" or its equipment, you must also do the following:**

- (1) Promptly notify the police if the covered "auto" or any of its equipment is stolen.
- (2) Take all reasonable steps to protect the covered "auto" from further damage. Also keep a record of your expenses for consideration in the settlement of the claim.
- (3) Permit us to inspect the covered "auto" and records proving the "loss" before its repair or disposition.
- (4) Agree to examinations under oath at our request and give us a signed statement of your answers.

**3. Legal Action Against Us**

No one may bring a legal action against us under this Coverage Form until:

- a. There has been full compliance with all the terms of this Coverage Form; and
- b. Under Covered Autos Liability Coverage, we agree in writing that the "insured" has an obligation to pay or until the amount of that obligation has finally been determined by judgment after trial. No one has the right under this policy to bring us into an action to determine the "insured's" liability.

**4. Loss Payment – Physical Damage Coverages**

At our option, we may:

- a. Pay for, repair or replace damaged or stolen property;
- b. Return the stolen property, at our expense. We will pay for any damage that results to the "auto" from the theft; or
- c. Take all or any part of the damaged or stolen property at an agreed or appraised value.

If we pay for the "loss", our payment will include the applicable sales tax for the damaged or stolen property.

**5. Transfer Of Rights Of Recovery Against Others To Us**

If any person or organization to or for whom we make payment under this Coverage Form has rights to recover damages from another, those rights are transferred to us. That person or organization must do everything necessary to secure our rights and must do nothing after "accident" or "loss" to impair them.

**B. General Conditions**

**1. Bankruptcy**

Bankruptcy or insolvency of the "insured" or the "insured's" estate will not relieve us of any obligations under this Coverage Form.

**2. Concealment, Misrepresentation Or Fraud**

This Coverage Form is void in any case of fraud by you at any time as it relates to this Coverage Form. It is also void if you or any other "insured", at any time, intentionally conceals or misrepresents a material fact concerning:

- a. This Coverage Form;
- b. The covered "auto";
- c. Your interest in the covered "auto"; or
- d. A claim under this Coverage Form.

**3. Liberalization**

If we revise this Coverage Form to provide more coverage without additional premium charge, your policy will automatically provide the additional coverage as of the day the revision is effective in your state.

**4. No Benefit To Beneficiary – Physical Damage Coverages**

We will not recognize any assignment or grant any coverage for the benefit of any person or organization holding, storing or transporting property for a fee regardless of any other provision of this Coverage Form.

**5. Other Insurance**

a. For any covered "auto" you own, this Coverage Form provides primary insurance. For any covered "auto" you don't own, the insurance provided by this Coverage Form is excess over any other collectible insurance. However, while a covered "auto" which is a "trailer" is connected to another vehicle, the Covered Autos Liability Coverage this Coverage Form provides for the "trailer" is:

- (1) Excess while it is connected to a motor vehicle you do not own; or
- (2) Primary while it is connected to a covered "auto" you own.

b. For Hired Auto Physical Damage Coverage, any covered "auto" you lease, hire, rent or borrow is deemed to be a covered "auto" you own. However, any "auto" that is leased, hired, rented or borrowed with a driver is not a covered "auto".

c. Regardless of the provisions of Paragraph a. above, this Coverage Form's Covered Autos Liability Coverage is primary for any liability assumed under an "insured contract".

d. When this Coverage Form and any other Coverage Form or policy covers on the same basis, either excess or primary, we will pay only our share. Our share is the proportion that the Limit of Insurance of our Coverage Form bears to the total of the limits of all the Coverage Forms and policies covering on the same basis.

**6. Premium Audit**

a. The estimated premium for this Coverage Form is based on the exposures you told us you would have when this policy began. We will compute the final premium due when we determine your actual exposures. The estimated total premium will be credited against the final premium due and the first Named Insured will be billed for the balance, if any. The due date for the final premium or retrospective premium is the date shown as the due date on the bill. If the estimated total premium exceeds the final premium due, the first Named Insured will get a refund.

b. If this policy is issued for more than one year, the premium for this Coverage Form will be computed annually based on our rates or premiums in effect at the beginning of each year of the policy.

**7. Policy Period, Coverage Territory**

Under this Coverage Form, we cover "accidents" and "losses" occurring:

- a. During the policy period shown in the Declarations; and
- b. Within the coverage territory.

The coverage territory is:

- (1) The United States of America;
- (2) The territories and possessions of the United States of America;
- (3) Puerto Rico;
- (4) Canada; and
- (5) Anywhere in the world if a covered "auto" of the private passenger type is leased, hired, rented or borrowed without a driver for a period of 30 days or less,

provided that the "insured's" responsibility to pay damages is determined in a "suit" on the merits, in the United States of America, the territories and possessions of the United States of America, Puerto Rico or Canada, or in a settlement we agree to.

We also cover "loss" to, or "accidents" involving, a covered "auto" while being transported between any of these places.

**8. Two Or More Coverage Forms Or Policies Issued By Us**

If this Coverage Form and any other Coverage Form or policy issued to you by us or any company affiliated with us applies to the same "accident", the aggregate maximum Limit of Insurance under all the Coverage Forms or policies shall not exceed the highest applicable Limit of Insurance under any one Coverage Form or policy. This condition does not apply to any Coverage Form or policy issued by us or an affiliated company specifically to apply as excess insurance over this Coverage Form.

**SECTION V - DEFINITIONS**

A. "Accident" includes continuous or repeated exposure to the same conditions resulting in "bodily injury" or "property damage".

B. "Auto" means:

- 1. A land motor vehicle, "trailer" or semitrailer designed for travel on public roads; or

2. Any other land vehicle that is subject to a compulsory or financial responsibility law or other motor vehicle insurance law where it is licensed or principally garaged.

However, "auto" does not include "mobile equipment".

C. "Bodily injury" means bodily injury, sickness or disease sustained by a person, including death resulting from any of these.

D. "Covered pollution cost or expense" means any cost or expense arising out of:

1. Any request, demand, order or statutory or regulatory requirement that any "insured" or others test for, monitor, clean up, remove, contain, treat, detoxify or neutralize, or in any way respond to, or assess the effects of, "pollutants"; or

2. Any claim or "suit" by or on behalf of a governmental authority for damages because of testing for, monitoring, cleaning up, removing, containing, treating, detoxifying or neutralizing, or in any way responding to, or assessing the effects of, "pollutants".

"Covered pollution cost or expense" does not include any cost or expense arising out of the actual, alleged or threatened discharge, dispersal, seepage, migration, release or escape of "pollutants":

a. That are, or that are contained in any property that is:

- (1) Being transported or towed by, handled or handled for movement into, onto or from the covered "auto";
- (2) Otherwise in the course of transit by or on behalf of the "insured"; or
- (3) Being stored, disposed of, treated or processed in or upon the covered "auto";

b. Before the "pollutants" or any property in which the "pollutants" are contained are moved from the place where they are accepted by the "insured" for movement into or onto the covered "auto"; or

c. After the "pollutants" or any property in which the "pollutants" are contained are moved from the covered "auto" to the place where they are finally delivered, disposed of or abandoned by the "insured".

Paragraph a. above does not apply to fuels, lubricants, fluids, exhaust gases or other similar "pollutants" that are needed for or result from the normal electrical, hydraulic or mechanical functioning of the covered "auto" or its parts, if:

- (1) The "pollutants" escape, seep, migrate or are discharged, dispersed or released directly from an "auto" part designed by its manufacturer to hold, store, receive or dispose of such "pollutants"; and
- (2) The "bodily injury", "property damage" or "covered pollution cost or expense" does not arise out of the operation of any equipment listed in Paragraph 6.b. or 6.c. of the definition of "mobile equipment".

Paragraphs b. and c. above do not apply to "accidents" that occur away from premises owned by or rented to an "insured" with respect to "pollutants" not in or upon a covered "auto" if:

- (a) The "pollutants" or any property in which the "pollutants" are contained are upset, overturned or damaged as a result of the maintenance or use of a covered "auto"; and
- (b) The discharge, dispersal, seepage, migration, release or escape of the "pollutants" is caused directly by such upset, overturn or damage.

- E. "Diminution in value" means the actual or perceived loss in market value or resale value which results from a direct and accidental "loss".
- F. "Employee" includes a "leased worker". "Employee" does not include a "temporary worker".
- G. "Insured" means any person or organization qualifying as an insured in the Who Is An Insured provision of the applicable coverage. Except with respect to the Limit of Insurance, the coverage afforded applies separately to each insured who is seeking coverage or against whom a claim or "suit" is brought.
- H. "Insured contract" means:
1. A lease of premises;
  2. A sidetrack agreement;
  3. Any easement or license agreement, except in connection with construction or demolition operations on or within 50 feet of a railroad;
  4. An obligation, as required by ordinance, to indemnify a municipality, except in connection with work for a municipality;

5. That part of any other contract or agreement pertaining to your business (including an indemnification of a municipality in connection with work performed for a municipality) under which you assume the tort liability of another to pay for "bodily injury" or "property damage" to a third party or organization. Tort liability means a liability that would be imposed by law in the absence of any contract or agreement; or
6. That part of any contract or agreement entered into, as part of your business, pertaining to the rental or lease, by you or any of your "employees", of any "auto". However, such contract or agreement shall not be considered an "insured contract" to the extent that it obligates you or any of your "employees" to pay for "property damage" to any "auto" rented or leased by you or any of your "employees".

An "insured contract" does not include that part of any contract or agreement:

- a. That indemnifies a railroad for "bodily injury" or "property damage" arising out of construction or demolition operations, within 50 feet of any railroad property and affecting any railroad bridge or trestle, tracks, roadbeds, tunnel, underpass or crossing;
  - b. That pertains to the loan, lease or rental of an "auto" to you or any of your "employees", if the "auto" is loaned, leased or rented with a driver; or
  - c. That holds a person or organization engaged in the business of transporting property by "auto" for hire harmless for your use of a covered "auto" over a route or territory that person or organization is authorized to serve by public authority.
- I. "Leased worker" means a person leased to you by a labor leasing firm under an agreement between you and the labor leasing firm to perform duties related to the conduct of your business. "Leased worker" does not include a "temporary worker".
- J. "Loss" means direct and accidental loss or damage.
- K. "Mobile equipment" means any of the following types of land vehicles, including any attached machinery or equipment:
1. Bulldozers, farm machinery, forklifts and other vehicles designed for use principally off public roads;
  2. Vehicles maintained for use solely on or next to premises you own or rent;
  3. Vehicles that travel on crawler treads;

4. Vehicles, whether self-propelled or not, maintained primarily to provide mobility to permanently mounted:
  - a. Power cranes, shovels, loaders, diggers or drills; or
  - b. Road construction or resurfacing equipment such as graders, scrapers or rollers;
5. Vehicles not described in Paragraph 1., 2., 3. or 4. above that are not self-propelled and are maintained primarily to provide mobility to permanently attached equipment of the following types:
  - a. Air compressors, pumps and generators, including spraying, welding, building cleaning, geophysical exploration, lighting and well-servicing equipment; or
  - b. Cherry pickers and similar devices used to raise or lower workers; or
6. Vehicles not described in Paragraph 1., 2., 3. or 4. above maintained primarily for purposes other than the transportation of persons or cargo. However, self-propelled vehicles with the following types of permanently attached equipment are not "mobile equipment" but will be considered "autos":
  - a. Equipment designed primarily for:
    - (1) Snow removal;
    - (2) Road maintenance, but not construction or resurfacing; or
    - (3) Street cleaning;
  - b. Cherry pickers and similar devices mounted on automobile or truck chassis and used to raise or lower workers; and
  - c. Air compressors, pumps and generators, including spraying, welding, building cleaning, geophysical exploration, lighting or well-servicing equipment.

However, "mobile equipment" does not include land vehicles that are subject to a compulsory or financial responsibility law or other motor vehicle insurance law where it is licensed or principally garaged. Land vehicles subject to a compulsory or financial responsibility law or other motor vehicle insurance law are considered "autos".

- L. "Pollutants" means any solid, liquid, gaseous or thermal irritant or contaminant, including smoke, vapor, soot, fumes, acids, alkalis, chemicals and waste. Waste includes materials to be recycled, reconditioned or reclaimed.
- M. "Property damage" means damage to or loss of use of tangible property.
- N. "Suit" means a civil proceeding in which:
  1. Damages because of "bodily injury" or "property damage"; or
  2. A "covered pollution cost or expense"; to which this insurance applies, are alleged.
 "Suit" includes:
  - a. An arbitration proceeding in which such damages or "covered pollution costs or expenses" are claimed and to which the "insured" must submit or does submit with our consent; or
  - b. Any other alternative dispute resolution proceeding in which such damages or "covered pollution costs or expenses" are claimed and to which the insured submits with our consent.
- O. "Temporary worker" means a person who is furnished to you to substitute for a permanent "employee" on leave or to meet seasonal or short-term workload conditions.
- P. "Trailer" includes semitrailer.

## WAIVER OF TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS TO US (WAIVER OF SUBROGATION)

This endorsement modifies insurance provided under the following:

AUTO DEALERS COVERAGE FORM  
BUSINESS AUTO COVERAGE FORM  
MOTOR CARRIER COVERAGE FORM

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by the endorsement.

This endorsement changes the policy effective on the inception date of the policy unless another date is indicated below.

<b>Named Insured:</b> Arric Corp
<b>Endorsement Effective Date:</b> 11/01/16

### SCHEDULE

<b>Name(s) Of Person(s) Or Organization(s):</b>
Any Principal wherein such waiver has been included before loss as part of a contractual undertaking by the Named Insured
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

The Transfer Of Rights Of Recovery Against Others To Us condition does not apply to the person(s) or organization(s) shown in the Schedule, but only to the extent that subrogation is waived prior to the "accident" or the "loss" under a contract with that person or organization.

## ENDORSEMENT

This endorsement forms a part of the policy to which it is attached. Please read it carefully.

### ADDITIONAL INSURED - BLANKET

This endorsement modifies insurance provided under the following:

#### ENVIRONMENTAL COMBINED POLICY

In consideration of the premium charged and notwithstanding anything contained in this policy to the contrary, it is hereby agreed and understood that this endorsement shall apply only to the Coverage Part(s) corresponding with the box or boxes marked below.

- COVERAGES A AND B - GENERAL LIABILITY
- COVERAGE D - CONTRACTORS POLLUTION LIABILITY

**SECTION III - WHO IS AN INSURED** is amended to include as an insured, with respect to Coverage A, B and D, any person(s) or organization(s) when you and such person(s) or organization(s) have agreed in a written contract or written agreement that such person(s) or organization(s) be added as an additional insured on your policy. Such written contract or written agreement must be in effect prior to the performance of your work which is the subject of such written contract or written agreement.

Such additional insured status applies only:

1. Under **COVERAGE A BODILY INJURY AND PROPERTY DAMAGE LIABILITY** and **COVERAGE B PERSONAL AND ADVERTISING INJURY LIABILITY** for claims or suits resulting from:
  - a. Your work performed for such person(s) or organization(s) in the performance of your ongoing operations for the additional insured; or
  - b. Your work performed for such person(s) or organizations(s) and included in the products-completed operations hazard.
2. Under **COVERAGE D CONTRACTORS POLLUTION LIABILITY** for claims or suits arising out of pollution conditions that are the result of:
  - a. Your work performed for such person(s) or organization(s) in the performance of your ongoing operations for the additional insured; or
  - b. Your work performed for such person(s) or organizations(s) and included in the products-completed operations hazard.

With respect to damages caused by your work, as described above, the coverage provided hereunder shall be primary and not contributing with any other insurance available to those person(s) or organization(s) with which you have so agreed in a written contract or written agreement.

**ALL OTHER TERMS AND CONDITIONS OF THE POLICY SHALL APPLY AND REMAIN UNCHANGED.**

## ENDORSEMENT

This endorsement forms a part of the policy to which it is attached. Please read it carefully.

### WAIVER OF SUBROGATION

It is agreed that the Company, in the event of any payment under this policy, waives its right of recovery against any Principal, but only at the specific written request of the Named Insured either before or after loss, wherein such waiver has been included before loss as part of a contractual undertaking by the Named Insured.

This waiver shall apply only with respect to losses occurring due to operations undertaken as per the specific contract existing between the Named Insured and such Principal and shall not be construed to be a waiver with respect to other operations of such Principal in which the Named Insured has no contractual interest.

No waiver of subrogation shall directly or indirectly apply to any employee, employees or agents of either the Named Insured or of the Principal, and the Company reserves its right or lien to be reimbursed from any recovery funds obtained by any injured employee.

This waiver does not apply in any jurisdiction or situation where such waiver is held to be illegal or against public policy or in any situation wherein the Principal against whom subrogation is to be waived is found to be solely negligent.



## EXCESS LIABILITY INSURANCE POLICY

Various provisions in this policy restrict coverage. Read the entire policy and any Underlying Insurance carefully to determine rights, duties and what is and is not covered.

Throughout this policy the words "you" and "your" refer to the Named Insured shown in the Declarations, and any other person or organization qualifying as a Named Insured under this policy. The words "we", "us", and "our" refer to the Company providing this insurance.

The word "Insured" refers to any person or organization which qualifies as such in the Underlying Insurance.

Other words and phrases that appear in bold have special meaning. Refer to III. DEFINITIONS.

### I. INSURING AGREEMENT

Subject to the applicable limits of insurance, we will pay those sums that the Insured becomes legally obligated to pay as damages in excess of the self insured retention and all Underlying Insurance, but only after all Underlying Insurance has been exhausted by payment of the limits of such insurance. This insurance is subject to the same terms, conditions, agreements, exclusions and definitions as the Underlying Insurance except with respect to any provisions to the contrary contained in this insurance. No other obligation or liability to pay sums or perform acts or services is covered. In no event shall this policy grant broader coverage than would be provided by any Underlying Insurance.

Notwithstanding the foregoing, if any Underlying Insurance shown in the Schedule of Underlying Insurance (Schedule) attached hereto has a limit of liability:

1. Greater than the amount shown in such Schedule of Underlying Insurance, then this policy will apply in excess of the greater amount; or
2. Less than the amount shown in such Schedule of Underlying Insurance, then this policy will apply in excess of the amount shown in such Schedule of Underlying Insurance.

### II. LIMITS OF INSURANCE

1. The amounts stated in the Declarations are the limits of insurance under this policy and are the maximum amount payable by us under this policy for all damages, including defense expenses. Defense expenses are part of, and not in addition to, the limits of insurance, and the payment of defense expenses reduces the limits of insurance.
2. Notwithstanding anything to the contrary, if any Underlying Insurance excludes or otherwise does not cover damages (for reasons other than the exhaustion of the Underlying Limits), then this policy will not provide coverage for such damages. If any Underlying Insurance contains a stated sub-limit of liability in respect to any coverage which is less than the limit of liability for that coverage set forth in the Schedule of Underlying Insurance, this policy shall not apply to any damages encompassed thereby, except as otherwise provided by written endorsement to this policy.

### III. DEFINITIONS

1. **Damages** means money damages.
2. **Defense expenses** means reasonable and necessary legal fees and expenses incurred in defense of claims. Defense expenses do not include salaries, wages or other overhead expenses of the Insured.
3. **Loss** means the total sum which the Insured shall become obligated to pay on account of liability which is covered under the Underlying Insurance.

4. **Underlying Insurance** means the liability insurance provided under the policy or policies shown in the Schedule of Underlying Insurance.
5. **Underlying Limits** means the limits of liability as set forth in the Schedule of Underlying Insurance, plus self-insured retentions or deductibles applicable to the Underlying Insurance.

#### IV. UNDERLYING INSURANCE

1. This policy is subject to the same representations and warranties as are contained in the application for any Underlying Insurance, and the same terms, definitions, conditions, exclusions and limitations as are contained in the Underlying Insurance (except as regards the premium, the limits of liability, the policy period, and except as otherwise provided herein).
2. The policy or policies referred to in the Schedule of Underlying Insurance or renewals or replacements thereof not more restrictive, shall be maintained as insurance in full force and effect during the term of this policy without alteration in their terms or conditions, except for any reduction of the limits of liability contained therein solely by payment there under. Failure to comply with the foregoing shall not invalidate this policy but, in the event of such failure, we will only be liable to the same extent as we would have been had you so maintained such policy or policies.
3. If during the policy period, the terms, conditions, exclusions or limitations of Underlying Insurance are changed in any manner, the insured shall as a condition precedent to its rights under this policy give to us as soon as practicable written notice of the full particulars thereof. This policy shall become subject to any such changes upon the effective date of the changes in the Underlying Insurance but only upon the condition that we agree to follow such changes by written endorsement attached hereto and the insured pays when due any additional premium required by us relating to such changes and/or agrees to any amendment of the provisions of this policy required by us relating to such changes.
4. The insured shall provide us as soon as practicable with written notice and the full particulars of (i) the exhaustion of the aggregate limit of liability of any Underlying Insurance, (ii) any Underlying Insurance not being maintained in full effect during the policy period, or (iii) any insurer issuing any Underlying Insurance becoming subject to receivership, liquidation, dissolution, rehabilitation or similar proceeding or being taken over by any regulatory authority.
5. The insured warrants that the Underlying Limits, where applicable, as shown in the Schedule of Underlying Insurance shall be unimpaired as of the effective date of this policy. In the event of non-concurrent policy periods between this policy and the Underlying Insurance, only covered events taking place during the policy period of this policy shall be considered in determining the extent of any erosion or exhaustion of the underlying aggregate limits.
6. The insured, not the insurer, will bear the risk that any Underlying Insurance is or may be uncollectible. This policy will not drop down for any reason, including, but not limited to, the uncollectibility (in whole or in part) of the Underlying Insurance, even if such uncollectibility is due to the financial impairment or insolvency of the issuer of any Underlying Insurance. Coverage under this policy will not be available unless and until all Underlying Insurance has been exhausted by the actual payment of loss.

#### V. NOTIFICATION, SETTLEMENT AND DEFENSE

1. As a condition precedent to the obligations of us under this policy, you must see to it that we are notified as soon as practicable of any incident that may result in a claim under this policy. You shall also provide other claim information or reports as reasonably requested by us from time to time.
2. The insured shall not do or omit to do anything to prejudice our rights under the policy. If we recommend a settlement of a claim:
  - a. For an amount within any remaining amount of the Underlying Limits and the insured refuses such settlement, we shall not be liable for any loss in excess of the recommended settlement or

- b. For a total amount in excess of the **Underlying Limits** and the Insured refuses such settlement, our liability for loss shall be limited to that portion of the recommended settlement and the costs, charges and expenses as of the Insured's refusal which exceed the **Underlying Limit**.
3. We will not be required to assume charge of the investigation of any claim or defense of any suit against you. We will have the right, but not the duty, to be associated with you or your underlying insurer or both in the investigation of any claim or defense of any suit which in our opinion may create liability on us for loss under this policy. If we exercise such right, we will do so at our own expense. If the limits of liability of the **Underlying Insurance** shown in the Schedule of **Underlying Insurance** are exhausted solely by payment of loss, we shall have the right but not the duty to investigate and settle any claim or assume the defense of any suit which, in our opinion, may give rise to a loss under this policy. We may, however, withdraw from the defense of such suit and tender the continued defense to you if our applicable limits of insurance shown on the Declarations are exhausted by payment of loss.

## VI. CONDITIONS

1. No change in, modification of, or assignment of interest under this policy shall be effective except when made by written endorsement to this policy which is signed by an authorized representative of us.
2. All salvages, recoveries or payments recovered or received subsequent to a loss settlement under this insurance shall be applied as if recovered or received prior to such settlement and all necessary adjustments shall then be made between the Insured and us, provided always that the foregoing shall not affect the time when the loss under this policy shall be payable.
3. All notices under this policy shall be given as provided for in the **Underlying Insurance**. In addition, all notices to us under this policy shall be sent to the address below or any substitute address as provided by us:

Berkley Specialty Underwriting Managers LLC  
Attention: Claims Department  
Three Ravinia Drive Suite 500  
Atlanta GA 30346

A.M. Best Rating Services

Great Divide Insurance Company (2)

A.M. Best #: 011231 NAIC #: 25224 FEDN #: 450397185

Mailing Address  
 P.O. Box 1594  
 Des Moines, IA 50306-1594  
 United States

[View Additional Address Information](#)



Assigned to insurance companies that have, in our opinion, a superior ability to meet their ongoing insurance obligations.

[View additional news, reports and products](#) for this company.

Web: [www.wrberkeley.com](http://www.wrberkeley.com)  
 Phone: 515-473-3174  
 Fax: 480-951-0905

Based on A.M. Best's analysis, [058498 - W. R. Berkeley Corporation](#) is the AMB Ultimate Parent and identifies the topmost entity of the corporate structure. View a list of [operating insurance entities](#) in this structure.

**Best's Credit Ratings**

**Financial Strength Rating [View Definition](#)**

Rating: A+ (Superior)  
 Affiliation Code: r (Reinsured)  
 Financial Size Category: XV (\$2 Billion or greater)  
 Outlook: Stable  
 Action: Affirmed  
 Effective Date: February 26, 2016  
 Initial Rating Date: December 16, 1991

**Long-Term Issuer Credit Rating [View Definition](#)**

Long-Term: aa-  
 Outlook: Stable  
 Action: Affirmed  
 Effective Date: February 26, 2016  
 Initial Rating Date: June 22, 2005

u Denotes Under Review Best's Rating

**Best's Credit Rating Analyst**

Rating Issued by: A.M. Best Rating Services, Inc.  
 Director: Jennifer Marshall, CPCU, ARM  
 Senior Director: Michael J. Lagomarsino, CFA, FRM

**Disclosure Information**



[View A.M. Best's Rating Disclosure Form](#)



[A.M. Best Affirms Ratings of W.R. Berkeley Corporation and Its Subsidiaries; Assists Rating to Subordinated Debentures](#)  
 February 26, 2016

**Rating History**

A.M. Best has provided ratings & analysis on this company since 1991.

**Financial Strength Rating**

Effective Date	Rating
2/26/2016	A+
1/22/2015	A+
12/13/2013	A+
5/9/2013	A+
12/14/2012	A+
10/25/2011	A+
4/11/2011	A+

**Long-Term Issuer Credit Rating**

Effective Date	Rating
2/26/2016	aa-
1/22/2015	aa-
12/13/2013	aa-
5/9/2013	aa-
12/14/2012	aa-
10/25/2011	aa-

STATE OF NEW YORK  
WORKERS' COMPENSATION BOARD

**CERTIFICATE OF NYS WORKERS' COMPENSATION INSURANCE COVERAGE**

<p><b>1a. Legal Name &amp; Address of Insured (Use street address only)</b>                  Arric Corp                  5033 Transit Road                  Depew, NY 14043</p> <p><i>Work Location of Insured (Only required if coverage is specifically limited to certain locations in New York State, i.e., a Wrap-Up Policy)</i></p>	<p><b>1b. Business Telephone Number of Insured</b>                  (716) 681-3535</p> <p><b>1c. NYS Unemployment Insurance Employer Registration Number of Insured</b>                  34-810742</p> <p><b>1d. Federal Employer Identification Number of Insured or Social Security Number</b>                  16-1342998</p>
<p><b>2. Name and Address of the Entity Requesting Proof of Coverage (Entity Being Listed as the Certificate Holder)</b></p> <p>Erie County Water Authority – Attn: Anthony Alessi                  295 Main Street,                  Suite 350                  Buffalo NY 14203</p> <p>Project No. 201500169</p>	<p><b>3a. Name of Insurance Carrier</b>                  Great Divide Insurance Co</p> <p><b>3b. Policy Number of entity listed in box "1a"</b>                  WCA152972816                  11231                  25224                  A+ XV</p> <p><b>3c. Policy effective period</b>                  11/01/2016 to 11/01/2017</p> <p><b>3d. The Proprietor, Partners or Executive Officers are</b>  <input checked="" type="checkbox"/> included. (Only check box if all partners/officers included)  <input type="checkbox"/> all excluded or certain partners/officers excluded.</p>

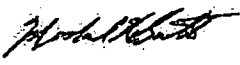
This certifies that the insurance carrier indicated above in box "3" insures the business referenced above in box "1a" for workers' compensation under the New York State Workers' Compensation Law. (To use this form, New York (NY) must be listed under Item 3A on the INFORMATION PAGE of the workers' compensation insurance policy). The Insurance Carrier or its licensed agent will send this Certificate of Insurance to the entity listed above as the certificate holder in box "2".

The Insurance Carrier will also notify the above certificate holder within 10 days IF a policy is canceled due to nonpayment of premiums or within 30 days IF there are reasons other than nonpayment of premiums that cancel the policy or eliminate the insured from the coverage indicated on this Certificate. (These notices may be sent by regular mail.) Otherwise, this Certificate is valid for one year after this form is approved by the insurance carrier or its licensed agent, or until the policy expiration date listed in box "3c"; whichever is earlier.

Please Note: Upon the cancellation of the workers' compensation policy indicated on this form, if the business continues to be named on a permit, license or contract issued by a certificate holder, the business must provide that certificate holder with a new Certificate of Workers' Compensation Coverage or other authorized proof that the business is complying with the mandatory coverage requirements of the New York State Workers' Compensation Law.

Under penalty of perjury, I certify that I am an authorized representative or licensed agent of the insurance carrier referenced above and that the named insured has the coverage as depicted on this form.

Approved by: Michael R. Bonetto  
 (Print name of authorized representative or licensed agent of insurance carrier)

Approved by:  11/29/16  
 (Signature) (Date)

Title: Authorized Representative

Telephone Number of authorized representative or licensed agent of insurance carrier: (716) 819-5500

Please Note: Only insurance carriers and their licensed agents are authorized to issue Form C-105.2. Insurance brokers are NOT authorized to issue it.



## Workers' Compensation Law

### Section 57. Restriction on issue of permits and the entering into contracts unless compensation is secured.

1. The head of a state or municipal department, board, commission or office authorized or required by law to issue any permit for or in connection with any work involving the employment of employees in a hazardous employment defined by this chapter, and notwithstanding any general or special statute requiring or authorizing the issue of such permits, shall not issue such permit unless proof duly subscribed by an insurance carrier is produced in a form satisfactory to the chair, that compensation for all employees has been secured as provided by this chapter. Nothing herein, however, shall be construed as creating any liability on the part of such state or municipal department, board, commission or office to pay any compensation to any such employee if so employed.

2. The head of a state or municipal department, board, commission or office authorized or required by law to enter into any contract for or in connection with any work involving the employment of employees in a hazardous employment defined by this chapter, notwithstanding any general or special statute requiring or authorizing any such contract, shall not enter into any such contract unless proof duly subscribed by an insurance carrier is produced in a form satisfactory to the chair, that compensation for all employees has been secured as provided by this chapter.

A.M. Best Rating Services

Great Divide Insurance Company (2)

A.M. Best #: 011231 NAIC #: 25224 FEIN #: 450397185

Mailing Address  
 P.O. Box 1594  
 Des Moines, IA 50306-1594  
 United States

[View Additional Address Information](#)



Assigned to insurance companies that have, in our opinion, a superior ability to meet their ongoing insurance obligations.

Web: [www.wberkeley.com](http://www.wberkeley.com)  
 Phone: 515-473-3174  
 Fax: 480-951-0905

[View additional news, reports and products](#) for this company.

Based on A.M. Best's analysis, [058498 - W. R. Berkley Corporation](#) is the AMB Ultimate Parent and identifies the topmost entity of the corporate structure. View a list of [operating insurance entities](#) in this structure.

**Best's Credit Ratings**

**Financial Strength Rating View Definition**

Rating: A+ (Superior)  
 Affiliation Code: r (Reinsured)  
 Financial Size Category: XV (\$2 Billion or greater)  
 Outlook: Stable  
 Action: Affirmed  
 Effective Date: February 26, 2016  
 Initial Rating Date: December 16, 1991

**Long-Term Issuer Credit Rating View Definition**

Long-Term: aa-  
 Outlook: Stable  
 Action: Affirmed  
 Effective Date: February 26, 2016  
 Initial Rating Date: June 22, 2005

u Denotes Under Review Best's Rating

**Best's Credit Rating Analyst**

Rating Issued by: A.M. Best Rating Services, Inc.  
 Director: Jennifer Marshall, CPCU, ARM  
 Senior Director: Michael J. Lagomarsino, CFA, FRM

**Disclosure Information**



[View A.M. Best's Rating Disclosure Form](#)



[A.M. Best Affirms Ratings of W.R. Berkley Corporation and Its Subsidiaries; Assigns Rating to Subordinated Debentures](#)  
 February 26, 2016

**Rating History**

A.M. Best has provided ratings & analysis on this company since 1991.

**Financial Strength Rating**

Effective Date	Rating
2/26/2016	A+
1/22/2015	A+
12/13/2013	A+
5/9/2013	A+
12/14/2012	A+
10/25/2011	A+
4/11/2011	A+

**Long-Term Issuer Credit Rating**

Effective Date	Rating
2/26/2016	aa-
1/22/2015	aa-
12/13/2013	aa-
5/9/2013	aa-
12/14/2012	aa-
10/25/2011	aa-

STATE OF NEW YORK  
WORKERS' COMPENSATION BOARD

CERTIFICATE OF INSURANCE COVERAGE UNDER THE NYS DISABILITY BENEFITS LAW

**PART 1. To be completed by Disability Benefits Carrier or Licensed Insurance Agent of that Carrier**

<p>1a. Legal Name and Address of Insured (Use street address only)</p> <p>ARRIC CORP 5033 TRANSIT ROAD DEPEW, NY 14043</p> <p>Work Location Of Insured (Only required if coverage is specifically limited to certain locations in New York State, i.e., a Wrap-Up Policy)</p>	<p>1b. Business Telephone Number Of Insured</p> <p>1c. NYS Unemployment Insurance Employer Registration Number of Insured</p> <p>1d. Federal Employer Identification Number of Insured or Social Security Number</p> <p>16-1342998</p>
---	--

<p>2. Name and Address of the Entity Requesting Proof of Coverage (Entity Being Listed as the Certificate Holder)</p> <p>Erie County Water Authority 295 Main St., Suite 350 Buffalo, NY 14203</p> <p style="text-align: center;">02408 25011 A XIV</p>	<p>3a. Name of Insurance Carrier</p> <p>WESCO INSURANCE COMPANY</p> <p>3b. Policy Number of entity listed in box "1a."</p> <p>0163348</p> <p>3c. Policy effective period:</p> <p>11/29/2016 to 12/31/2017</p>
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4. Policy covers:

a.  All of the employer's employees eligible under the New York Disability Benefits Law

b.  Only the following class or classes of the employer's employees:

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Under penalty of perjury, I certify that I am an authorized representative or licensed agent of the insurance carrier referenced above and that the named insured has NYS Disability Benefits insurance coverage as described above.

Date Signed 11/29/2016 By *Kathleen Dina*

(Signature of insurance carrier's authorized representative or NYS Licensed Insurance Agent of that insurance carrier)

Telephone Number 800-535-2711 Title Vice President

**IMPORTANT:** If box "4a" is checked, and this form is signed by the insurance carrier's authorized representative or NYS Licensed Insurance Agent of that carrier, this certificate is COMPLETE. Mail it directly to the certificate holder.  
If box "4b" is checked, this certificate is NOT COMPLETE for purposes of Section 220, Subd. 8 of the Disability Benefits Law. It must be mailed for completion to the Workers' Compensation Board, DB Plans Acceptance Unit, 328 State Street, Schenectady, NY 12305.

**PART 2. To be completed by NYS Workers' Compensation Board (Only if box "4b" of Part 1 has been checked)**

**State of New York  
Workers' Compensation Board**

According to information maintained by the NYS Workers' Compensation Board, the above-named employer has complied with the NYS Disability Benefits Law with respect to all of his/her employees.

Date Signed \_\_\_\_\_ By \_\_\_\_\_

(Signature of NYS Workers' Compensation Board Employee)

Telephone Number \_\_\_\_\_ Title \_\_\_\_\_

Please Note: Only insurance carriers licensed to write NYS disability benefits insurance policies and NYS licensed insurance agents of those insurance carriers are authorized to issue Form DB-120.1. Insurance brokers are NOT authorized to issue this form.

APPROVED DEC 08 2016

*[Handwritten mark]*



### Additional Instructions for Form DB-120.1

By signing this form, the insurance carrier identified in box "3" on this form is certifying that it is insuring the business referenced in box "1a" for disability benefits under the New York State Disability Benefits Law. The insurance carrier or its licensed agent will send this Certificate of Insurance to the entity listed as the certificate holder in box "2".

Will the carrier notify the certificate holder within 10 days of a policy being cancelled for non-payment of premium or within 30 days if cancelled for any other reason or if the insured is otherwise eliminated from the coverage indicated on this certificate prior to the end of the policy effective period?  YES  NO

This certificate is issued as a matter of information only and confers no rights upon the certificate holder. This certificate does not amend, extend or alter the coverage afforded by the policy listed, nor does it confer any rights or responsibilities beyond those contained in the referenced policy.

This certificate may be used as evidence of a Disability Benefits contract of insurance only while the underlying policy is in effect.

Please Note: Upon the cancellation of the disability benefits policy indicated on this form, if the business continues to be named on a permit, license or contract issued by a certificate holder, the business must provide that certificate holder with a new Certificate of NYS Disability Benefits Coverage or other authorized proof that the business is complying with the mandatory coverage requirements of the New York State Disability Benefits Law.

### DISABILITY BENEFITS LAW

#### §220. Subd. 8

(a) The head Of a state Or municipal department, board, commission Or office authorized Or required by law To issue any permit For Or In connection With any work involving the employment Of employees In employment As defined In this article, And Not withstanding any general Or special statute requiring Or authorizing the issue Of such permits, shall Not issue such permit unless proof duly subscribed by an insurance carrier Is produced In a form satisfactory To the chair, that the payment Of disability benefits For all employees has been secured As provided by this article. Nothing herein, however, shall be construed As creating any liability On the part Of such state Or municipal department, board, commission Or office To pay any disability benefits To any such employee If so employed.

(b) The head Of a state Or municipal department, board, commission Or office authorized Or required by law To enter into any contract For Or In connection With any work involving the employment Of employees In employment As defined In this article, And notwithstanding any general Or special statute requiring Or authorizing any such contract, shall Not enter into any such contract unless proof duly subscribed by an insurance carrier Is produced In a form satisfactory To the chair, that the payment Of disability benefits For all employees has been secured As provided by this article.

A.M. Best Rating Services

Wesco Insurance Company

A.M. Best #: 002468 NAIC #: 25011 FEIN #: 650165763  
 Administrative Office  
 59 Maiden Lane 6th Floor  
 New York, NY 10038  
 United States

[View Additional Address Information](#)



Assigned to insurance companies that have, in our opinion, an excellent ability to meet their ongoing insurance obligations.

Web: [www.amtrustorcorp.com](http://www.amtrustorcorp.com)  
 Phone: 212-220-7120  
 Fax: 212-220-7130

[View additional news, reports and products](#) for this company.

Based on A.M. Best's analysis, 051002 - AmTrust Financial Services, Inc is the AMB Ultimate Parent and identifies the topmost entity of the corporate structure. View a list of [operating insurance entities](#) in this structure.

**Best's Credit Ratings**

**Financial Strength Rating [View Definition](#)**

Rating:	A (Excellent)
Affiliation Code:	g (Group)
Financial Size Category:	XIV (\$1.5 Billion to \$2 Billion)
Outlook:	Stable
Action:	Affirmed
Effective Date:	July 08, 2016
Initial Rating Date:	June 30, 1984

**Long-Term Issuer Credit Rating [View Definition](#)**

Long-Term:	a
Outlook:	Stable
Action:	Affirmed
Effective Date:	July 08, 2016
Initial Rating Date:	June 22, 2005

u Denotes [Under Review Best's Rating](#)

**Best's Credit Rating Analyst**

Rating issued by: A.M. Best Rating Services, Inc.  
 Director: Jennifer Marshall, CPCU, ARM  
 Senior Director: Michael J. Lagomarsino, CFA, FRM

**Disclosure Information**



[View A.M. Best's Rating Disclosure Form](#)



[A.M. Best Affirms Ratings of AmTrust Financial Services, Inc. and Its Subsidiaries](#)  
 July 08, 2016

**Rating History**

A.M. Best has provided ratings & analysis on this company since 1984.

**Financial Strength Rating**

Effective Date	Rating
7/8/2016	A
5/29/2015	A
5/30/2014	A
5/24/2013	A
5/29/2012	A

**Long-Term Issuer Credit Rating**

Effective Date	Rating
7/8/2016	a
5/29/2015	a
5/30/2014	a
5/24/2013	a
5/29/2012	a

**AMB Credit Reports**

<http://www3.ambest.com/ratings/entities/SearchResults.aspx?SR=1>

**Erie County Water Authority Insurance Requirements for Contracting Services**

**Project Number:** 201500169

**Description:** OBG-12A Sturgeon Point and VanDeWater Improvements Project.

The following minimum insurance requirements shall apply to contractors providing services to the Erie County Water Authority (ECWA). If a service or project, in the opinion of ECWA, represents an unusual or exceptional risk, ECWA 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.

An X indicates insurance coverage is required.

X **Commercial General Liability Insurance:** (including, but not limited to, Bodily (Personal) Injury, Premises Operations, Property Damage Liability (broad form), Contractual Liability, Advertising Injury, Independent Contractors, Product Liability, Completed Operations Liability and Explosion, Collapse and Underground Coverage) – in an amount not less than \$1,000,000 combined single limit and \$2,000,000 in the aggregate:

     Per Policy

    X Per Project or Job

     Per Location

There should be no exclusions for any claims filed, actual or alleged, for violation of any applicable statute including, but not limited to, the New York State or federal labor laws, ordinances, administrative orders, executive orders, rules, regulations, or decrees of any court of competent jurisdiction.

X **Commercial Business Automobile Insurance** in an amount of not less than \$1,000,000 each accident and shall cover liability arising out of any automobile owned, leased, hired, borrowed and non-owned automobiles. Additionally, if vehicles are used for transporting hazardous materials, the contractor shall obtain and maintain the “broadened” coverage (endorsement CA 99 48), as well as proof of MCS 90 04 00.

X **Excess Umbrella Liability Insurance** in an amount of not less than:

\_\_\_ \$1,000,000 in the aggregate

\_\_\_ \$2,000,000 in the aggregate

\_\_\_ \$3,000,000 in the aggregate

\_\_\_ \$4,000,000 in the aggregate

X \$5,000,000 in the aggregate

\_\_\_ **Per Policy**

X **Per Project or Job**

\_\_\_ **Per Location**

X **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.

X **Pollution Legal Liability Insurance** in an amount of not less than:

\_\_\_ \$1,000,000 in the aggregate

\_\_\_ \$2,000,000 in the aggregate

\_\_\_ \$3,000,000 in the aggregate

\_\_\_ \$4,000,000 in the aggregate

X \$5,000,000 in the aggregate

\_\_\_ **Per Policy**

X **Per Project or Job**

\_\_\_ **Per Location**

And, if disposal of materials is involved, the disposal site operator must carry

Pollution Legal Liability Insurance in an amount of not less than:

- \$1,000,000 in the aggregate
  - \$2,000,000 in the aggregate
  - \$3,000,000 in the aggregate
  - \$4,000,000 in the aggregate
  - \$5,000,000 in the aggregate
- Per Policy
  - Per Project or Job
  - Per Location

**Workers' Compensation and Employers' Liability and New York State Disability Benefits Insurances**, as required by New York State statute. If employees of the contractor will be working on or near navigable waters, US Longshore and Harbor Workers Compensation Act endorsement must be included.

Certificates of Insurance, on forms approved by the New York State Department of Insurance, must be submitted to ECWA 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 ECWA 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 ECWA 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 ECWA, 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.

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 ECWA shall not be construed to relieve the outside vendor of any obligations, responsibilities or liabilities.

Certificates of Insurance should be e-mailed to [AALESSI@ECWA.ORG](mailto:AALESSI@ECWA.ORG) or mailed to Mr. Anthony Alessi, ECWA Claims 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 Mr. Alessi by e-mail or phone (716) 849-8477.

Please refer to the bid and the contract document(s) for additional information regarding insurance requirements.



# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

**IMPORTANT:** If the certificate holder is an **ADDITIONAL INSURED**, the policy(ies) must be endorsed. If **SUBROGATION IS WAIVED**, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
	PHONE (A/C, No. Ext):	FAX (A/C, No):
	E-MAIL:	
	ADDRESS:	
	PRODUCER CUSTOMER ID #:	
	INSURER(S) AFFORDING COVERAGE	
	NAIC #	
INSURED	INSURER A:	
	INSURER B:	
	INSURER C:	
	INSURER D:	
	INSURER E:	
	INSURER F:	

**COVERAGES, CERTIFICATE NUMBER: REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL SUBR INSR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
	<b>GENERAL LIABILITY</b>					
<input checked="" type="checkbox"/>	COMMERCIAL GENERAL LIABILITY					EACH OCCURRENCE \$ 1,000,000
	CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR					DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 100,000
<input checked="" type="checkbox"/>	Blanket Broad Form	X X				MED EXP (Any one person) \$ 5,000
	Contractual					PERSONAL & ADV INJURY \$ 1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:					GENERAL AGGREGATE \$ 2,000,000
	POLICY <input checked="" type="checkbox"/> PROJECT <input type="checkbox"/> LOC					PRODUCTS - COMP/OP AGG \$ 2,000,000
	<b>AUTOMOBILE LIABILITY</b>					
<input checked="" type="checkbox"/>	ANY AUTO					COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000
	ALL OWNED AUTOS	X X				BODILY INJURY (Per person) \$
	SCHEDULED AUTOS					BODILY INJURY (Per accident) \$
	HIRED AUTOS					PROPERTY DAMAGE (Per accident) \$
	NON-OWNED AUTOS					\$
	<b>UMBRELLA LIAB</b> <input checked="" type="checkbox"/> OCCUR					EACH OCCURRENCE \$
	EXCESS LIAB CLAIMS-MADE <input checked="" type="checkbox"/>	X X				AGGREGATE \$
	DEDUCTIBLE					\$
<input checked="" type="checkbox"/>	RETENTION \$ 10,000					\$
	<b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b>					
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) <input type="checkbox"/> Y/N	N/A				WC STATUTORY LIMITS   OTHER
	If yes, describe under DESCRIPTION OF OPERATIONS below					E.L. EACH ACCIDENT \$
						E.L. DISEASE - EA EMPLOYEE \$
						E.L. DISEASE - POLICY LIMIT \$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)  
Additional Insured on a Primary and non-contributory basis: Erie County Water Authority  
Additional Insured endorsement CG 20 10 11 85 or equivalent

<b>CERTIFICATE HOLDER</b>	<b>CANCELLATION</b>
Erie County Water Authority 295 Main St, Suite 350 Buffalo, NY 14203  Attn: Anthony Alessi	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.  AUTHORIZED REPRESENTATIVE

# Understanding New York Workers Compensation Board Workers Compensation and N.Y.S Disability Benefits Liability

This is a brief description for governmental organizations to validate vendor workers compensation and NYS Disability Benefits coverage. These requirements should be used when applying for permits, licenses or secure contracts. Copies should be obtained not only at the initial issuance but at renewal as well. A full instruction manual can be obtained from the Workers Comp Board.

The forms discussed are:

1) Form CE-200- Affidavit of Exemption (obtain at: [www.wcb.state.ny.us/content/ebiz/wc\\_db\\_exemptions/requestExemptionOverview.jsp](http://www.wcb.state.ny.us/content/ebiz/wc_db_exemptions/requestExemptionOverview.jsp))

- Acceptable proof that the business listed is exempt from providing workers' compensation and/or disability insurance coverage.

2) Workers Compensation

- Form C-105.2: Certificate of Workers Compensation (WC) (Obtain from your insurance agent)
  - All private NYS licensed workers' compensation carriers are required to issue the C-105.2.
- Form SI- 12: Certificate of WC when self-insured. (Obtain from workers compensation board)
  - Only the Self-Insurance Office of the Workers' Compensation Board issues the SI-12. The Self-Insurance Office can be contacted at **518-402-0247**. **Only one legal name and Federal Employer Identification Number can be listed on each Form SI-12. (Multiple legal entities must not be listed.)**
- Form GSI- 105.2: Certificate of WC when participating in a group self-insured program.
  - The self-insurance administrator of the group completes the form.
- Form U-26.3: Certificate of WC
  - Acceptable proof that the business has workers' compensation coverage through the New York State Insurance Fund. Only available through (NYSIF).

3) New York State Disability Benefits Law (DBL)

- Form DB-120.1: Certificate of DBL Insurance (obtain from workers compensation board)
  - The DB-120.1 must be completed by either the NYS statutory disability benefits insurance carrier, or a licensed NYS insurance agent of that carrier. The form can be obtained by contacting the Bureau of Compliance. ([certificates@wcb.state.ny.us](mailto:certificates@wcb.state.ny.us))
- Form DB-155: Certificate of DBL Self-Insurance
  - The Self-Insurance Office of the Workers' Compensation Board issues the DB-155. The Board's secretary will approve the DB-155. The Self-Insurance Office can be contacted at **518-402-0247**.

4) Exemption 1, 2, 3, or 4 Family, Owner Occupied residence (<http://www.wcb.state.ny.us/content/main/forms/bp-1.pdf>)

NOTE: ACORD Certificates of Insurance are not acceptable proof. Must use one of the forms noted above:





**Certificate of Attestation of Exemption  
From New York State Workers' Compensation  
and/or Disability Benefits Insurance Coverage**

*\*\*This form cannot be used to waive the workers' compensation rights or obligations of any party.\*\**

The applicant may use this Certificate of Attestation of Exemption **ONLY** to show a government entity that New York State specific workers' compensation and/or disability benefits insurance is not required. The applicant may **NOT** use this form to show another business or that business's insurance carrier that such insurance is not required.

Please provide this form to the government entity from which you are requesting a permit, license or contract. This Certificate will not be accepted by government officials one year after the date printed on the form.

<p align="center"><b>In the Application of</b> (Legal Entity Name and Address):</p> <p><b>JOHN SMITH</b> 123 MAIN STREET ALBANY, NY 12207 111-111-1111 Federal ID Number: XXXXX6789</p>	<p align="center"><b>Business Applying For:</b> <b>BUILDING PERMIT</b></p> <p>From: <b>CITY OF ALBANY, DEPT OF BUILDING AND CODES</b></p> <p>The location of where work will be performed is <b>123 ACME AVENUE, ALBANY, NY 12203.</b></p> <p>Estimated dates necessary to complete work associated with the building permit are from <b>October 14, 2008 to March 31, 2009.</b></p> <p>The estimated dollar amount of project is <b>\$25,001 - \$50,000</b></p>
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**Workers' Compensation Exemption Statement:**

The above named business is certifying that it is **NOT REQUIRED TO OBTAIN NEW YORK STATE SPECIFIC WORKERS' COMPENSATION INSURANCE COVERAGE** for the following reason:

The business is owned by one individual and is not a corporation. Other than the owner, there are no employees, day labor, leased employees, borrowed employees, part-time employees, unpaid volunteers (including family members) or subcontractors.

**Disability Benefits Exemption Statement:**

The above named business is certifying that it is **NOT REQUIRED TO OBTAIN NEW YORK STATE STATUTORY DISABILITY BENEFITS INSURANCE COVERAGE** for the following reason:

The business is owned by one individual or is a partnership (LLC, LLP, PLLP or a RLLP) under the laws of New York State and is not a corporation; or is a one or two person owned corporation, with those individuals owning all of the stock and holding all offices of the corporation (in a two person owned corporation, each individual must be an officer and own at least one share of stock) or is a business with no NYS location. In addition, the business does not require disability benefits coverage at this time since it has not employed one or more individuals on at least 30 days in any calendar year in New York State. (Independent contractors are not considered to be employees under the Disability Benefits Law.)

I, JOHN SMITH, am the Sole Proprietor with the above-named legal entity. I affirm that due to my position with the above-named business I have the knowledge, information and authority to make this Certificate of Attestation of Exemption. I hereby affirm that the statements made herein are true, that I have not made any materially false statements and I make this Certificate of Attestation of Exemption under the penalties of perjury. I further affirm that I understand that any false statements, representation or concealment will subject me to felony criminal prosecution, including jail and civil liability in accordance with the Workers' Compensation Law and all other New York State laws. By submitting this Certificate of Attestation of Exemption to the government entity listed above I also hereby affirm that if circumstances change so that workers' compensation insurance and/or disability benefits coverage is required, the above-named legal entity will immediately acquire appropriate New York State specific workers' compensation insurance and/or disability benefits coverage and also immediately furnish proof of that coverage on forms approved by the Chair of the Workers' Compensation Board to the government entity listed above.

<b>SIGN HERE</b>	Signature: _____	Date: _____
<b>Exemption Certificate Number</b> <b>2008-00197</b>		<b>Received</b> <b>October 2, 2008</b> <b>NYS Workers' Compensation Board</b>

STATE OF NEW YORK  
WORKERS' COMPENSATION BOARD

**CERTIFICATE OF NYS WORKERS' COMPENSATION INSURANCE COVERAGE**

<p><b>1a. Legal Name &amp; Address of Insured (Use street address only)</b></p>  <p><b>Work Location of Insured (Only required if coverage is specifically limited to certain locations in New York State, i.e., a Wrap-Up Policy)</b></p>	<p><b>1b. Business Telephone Number of Insured</b></p> <p><b>1c. NYS Unemployment Insurance Employer Registration Number of Insured</b></p> <p><b>1d. Federal Employer Identification Number of Insured or Social Security Number</b></p>
<p><b>2. Name and Address of the Entity Requesting Proof of Coverage (Entity Being Listed as the Certificate Holder)</b></p>	<p><b>3a. Name of Insurance Carrier</b></p> <p><b>3b. Policy Number of entity listed in box "1a"</b></p> <p><b>3c. Policy effective period</b> _____ to _____</p> <p><b>3d. The President, Partners or Executive Officers are included. (Only check box if all partners/officers included) all excluded or certain partners/officers excluded.</b></p>

This certifies that the insurance carrier indicated above in box "3" insures the business referenced above in box "1a" for workers' compensation under the New York State Workers' Compensation Law. **(To use this form, New York (NY) must be listed under Item 3A on the INFORMATION PAGE of the workers' compensation insurance policy).** The Insurance Carrier or its licensed agent will send this Certificate of Insurance to the entity listed above as the certificate holder in box "2".

*The Insurance Carrier will also notify the above certificate holder within 10 days IF a policy is canceled due to nonpayment of premiums or within 30 days IF there are reasons other than nonpayment of premiums that cancel the policy or eliminate the insured from the coverage indicated on this Certificate. (These notices may be sent by regular mail.) Otherwise, this Certificate is valid for one year after this form is approved by the insurance carrier or its licensed agent, or until the policy expiration date listed in box "3c", whichever is earlier.*

**Please Note: Upon the cancellation of the workers' compensation policy indicated on this form, if the business continues to be named on a permit, license or contract issued by a certificate holder, the business must provide that certificate holder with a new Certificate of Workers' Compensation Coverage or other authorized proof that the business is complying with the mandatory coverage requirements of the New York State Workers' Compensation Law.**

**Under penalty of perjury, I certify that I am an authorized representative or licensed agent of the insurance carrier referenced above and that the named insured has the coverage as depicted on this form.**

Approved by: \_\_\_\_\_  
(Print name of authorized representative or licensed agent of insurance carrier)

Approved by: \_\_\_\_\_  
(Signature) (Date)

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

Telephone Number of authorized representative or licensed agent of insurance carrier: \_\_\_\_\_

**Please Note: Only insurance carriers and their licensed agents are authorized to issue Form C-105.2. Insurance brokers are NOT authorized to issue it.**

## Workers' Compensation Law

### Section 57. Restriction on issue of permits and the entering into contracts unless compensation is secured.

1. The head of a state or municipal department, board, commission or office authorized or required by law to issue any permit for or in connection with any work involving the employment of employees in a hazardous employment defined by this chapter, and notwithstanding any general or special statute requiring or authorizing the issue of such permits, shall not issue such permit unless proof duly subscribed by an insurance carrier is produced in a form satisfactory to the chair, that compensation for all employees has been secured as provided by this chapter. Nothing herein, however, shall be construed as creating any liability on the part of such state or municipal department, board, commission or office to pay any compensation to any such employee if so employed.
2. The head of a state or municipal department, board, commission or office authorized or required by law to enter into any contract for or in connection with any work involving the employment of employees in a hazardous employment defined by this chapter, notwithstanding any general or special statute requiring or authorizing any such contract, shall not enter into any such contract unless proof duly subscribed by an insurance carrier is produced in a form satisfactory to the chair, that compensation for all employees has been secured as provided by this chapter.

**SAMPLE**



STATE OF NEW YORK  
WORKERS' COMPENSATION BOARD  
SELF-INSURANCE OFFICE  
20 PARK STREET - ROOM 206  
ALBANY, NY 12207



(518) 402-0247  
FAX (518) 402-6199

COMPLIANCE WITH DISABILITY BENEFITS LAW  
(Pursuant To Section 220, subd. 8 of the Disability Benefits Law)

EMPLOYER	FEDERAL EMPLOYER IDENTIFICATION NUMBER
	LOCATION OF OPERATION
ADDRESS (HOME OR MAIN OFFICE)	OPERATIONS TO BE REVIEWED OR ABOUT:

There are on file with the Workers' Compensation Board, documents indicating that the above-named employer has complied with the Disability Benefits Law with respect to all of his or her employees in the following manner:

- By approved self-insurance pursuant to Section 211, subdivision 3 of the Disability Benefits Law.
- By a combination of approved self-insurance pursuant to Section 211, subdivision 3 of the Disability Benefits Law and insurance with authorized insurance carrier(s).

Date:

By: \_\_\_\_\_  
Gina Wagoner  
WC Examiner

DB-155 (1/04)

THIS AGENCY EMPLOYS & SERVES PEOPLE WITH DISABILITIES WITHOUT DISCRIMINATION



# New York State Insurance Fund

Workers' Compensation & Disability Benefits Specialists Since 1914

199 CHURCH STREET, NEW YORK, N.Y. 10007-1100  
Phone: (888) 997-3863

## CERTIFICATE OF WORKERS' COMPENSATION INSURANCE

\*\*\*\*\*

POLICYHOLDER		CERTIFICATE HOLDER	
POLICY NUMBER	CERTIFICATE NUMBER	PERIOD COVERED BY THIS CERTIFICATE 01/01/2009 TO 05/01/2010	DATE 1/8/2009

THIS IS TO CERTIFY THAT THE POLICYHOLDER NAMED ABOVE IS INSURED WITH THE NEW YORK STATE INSURANCE FUND UNDER POLICY NO. 2058 840-6 UNTIL 05/01/2010, COVERING THE ENTIRE OBLIGATION OF THIS POLICYHOLDER FOR WORKERS' COMPENSATION UNDER THE NEW YORK WORKERS' COMPENSATION LAW WITH RESPECT TO ALL OPERATIONS IN THE STATE OF NEW YORK, EXCEPT AS INDICATED BELOW.

IF SAID POLICY IS CANCELLED, OR CHANGED PRIOR TO 05/01/2010 IN SUCH MANNER AS TO AFFECT THIS CERTIFICATE, 10 DAYS WRITTEN NOTICE OF SUCH CANCELLATION WILL BE GIVEN TO THE CERTIFICATE HOLDER ABOVE. NOTICE BY REGULAR MAIL SO ADDRESSED SHALL BE SUFFICIENT COMPLIANCE WITH THIS PROVISION. THE NEW YORK STATE INSURANCE FUND DOES NOT ASSUME ANY LIABILITY IN THE EVENT OF FAILURE TO GIVE SUCH NOTICE.

THIS CERTIFICATE DOES NOT APPLY TO BUILDING DEMOLITION.

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS NOR INSURANCE COVERAGE UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICY.

NEW YORK STATE INSURANCE FUND

DIRECTOR, INSURANCE FUND UNDERWRITING

This certificate can be validated on our web site at <https://www.nysif.com/cert/certval.asp> or by calling (888) 875-5790  
VALIDATION NUMBER: 107031806

STATE OF NEW YORK  
WORKERS' COMPENSATION BOARD  
**CERTIFICATE OF PARTICIPATION IN WORKERS' COMPENSATION  
GROUP SELF-INSURANCE**

1a. Legal Name and Address of Business Participating in Group Self-Insurance (Use Street Address Only)	1d. Business Telephone Number of Business referenced in box "1a"
	1e. NYS Unemployment Insurance Employer Registration Number of Business referenced in box "1a"
1b. Effective Date of Membership in the Group	
1c. The Proprietor, Partners or Executive Officers are <input type="checkbox"/> included (Only check box if all partners/officers included) <input checked="" type="checkbox"/> included all excluded or certain partners/officers excluded	1f. Federal Employer Identification Number of Business referenced in box "1a"
2. Name and Address of the Entity Requesting Proof of Coverage (Entity Being Listed as Certificate Holder)	3. Name and Address of Group Self-Insurer

This certifies that the business referenced above in box "1a" is complying with the mandatory coverage requirements of the New York State Workers' Compensation Law as a participating member of the Group Self-Insurer listed above in box "3" and participation in such group self-insurance is still in force. The Group Self-Insurer's Administrator will send this Certificate of Participation to the entity listed above as the certificate holder in box "2".

The Group Self-Insurer's Administrator will notify the above certificate holder within 10 days IF the membership of the participant listed in box "1a" is terminated. (These notices may be sent by regular mail.) Otherwise, this Certificate is valid for a maximum of one year from the date certified by the group self-insurer.

*If this certificate is no longer valid according to the above guidelines and the business referenced in box "1a" continues to be named on a permit, license or contract issued by the certificate holder, the business must provide the certificate holder either with a new certificate or other authorized proof the business is complying with the mandatory coverage requirements of the New York State Workers' Compensation Law.*

**Under penalty of perjury, I certify that I am an authorized representative of the Group Self-Insurer referenced above and that the business referenced in box "1a" has the coverage as depicted on this form.**

Certified by: \_\_\_\_\_  
(Print name of authorized representative of the Group Self-Insurer)

Certified by: \_\_\_\_\_  
(Signature) (Date)

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

Telephone Number: \_\_\_\_\_

STATE OF NEW YORK  
WORKERS' COMPENSATION BOARD

**CERTIFICATE OF INSURANCE COVERAGE UNDER THE NYS DISABILITY BENEFITS LAW**

**PART 1. To be completed by Disability Benefits Carrier or Licensed Insurance Agent of that Carrier**

<p>1a. Legal Name and Address of Insured (Use street address only)</p>	<p>1b. Business Telephone Number of Insured</p> <p>1c. NYS Unemployment Insurance Employer Registration Number of Insured</p> <p>1d. Federal Employer Identification Number of Insured or Social Security Number</p>
<p>2. Name and Address of the Entity Requesting Proof of Coverage (Entity Being Listed as the Certificate Holder)</p> <p>State University of New York Room 302 1400 Washington Avenue Albany, NY 12222</p>	<p>3a. Name of Insurance Carrier</p> <p>3b. Policy Number of entity listed in box "1a":</p> <p>3c. Policy effective period: _____ to _____</p>

4. Policy covers:

a.  All of the employer's employees eligible under the New York Disability Benefits Law

b.  Only the following class or classes of the employer's employees:

Under penalty of perjury, I certify that I am an authorized representative or licensed agent of the insurance carrier referenced above and that the named insured has NYS Disability Benefits insurance coverage as described above.

Date Signed \_\_\_\_\_ By \_\_\_\_\_  
(Signature of insurance carrier's authorized representative or NYS Licensed Insurance Agent of that insurance carrier)

Telephone Number \_\_\_\_\_ Title \_\_\_\_\_

**IMPORTANT:** If box "4a" is checked, and this form is signed by the insurance carrier's authorized representative or NYS Licensed Insurance Agent of that carrier, this certificate is COMPLETE. Mail it directly to the certificate holder.  
If box "4b" is checked, this certificate is NOT COMPLETE for purposes of Section 220, Subd. 8 of the Disability Benefits Law. It must be mailed for completion to the Workers' Compensation Board, DB Plans Acceptance Unit, 20 Park Street, Albany, New York 12207.

**PART 2. To be completed by NYS Workers' Compensation Board (Only if box "4b" of Part 1 has been checked)**

**State Of New York  
Workers' Compensation Board**

According to information maintained by the NYS Workers' Compensation Board, the above-named employer has complied with the NYS Disability Benefits Law with respect to all of his/her employees.

Date Signed \_\_\_\_\_ By \_\_\_\_\_  
(Signature of NYS Workers' Compensation Board Employee)

Telephone Number \_\_\_\_\_ Title \_\_\_\_\_

*Please Note: Only insurance carriers licensed to write NYS disability benefits insurance policies and NYS-licensed insurance agents of those insurance carriers are authorized to issue Form DB-120.1. Insurance brokers are NOT authorized to issue this form.*

FORM DB-155



STATE OF NEW YORK  
WORKERS' COMPENSATION BOARD  
SELF-INSURANCE OFFICE  
20 PARK STREET - ROOM 206  
ALBANY, NY 12207



(518) 402-0247  
FAX (518) 402-6199

COMPLIANCE WITH DISABILITY BENEFITS LAW  
(Pursuant To Section 220, subd. 5, of the Disability Benefits Law)

EMPLOYER	FEDERAL EMPLOYER IDENTIFICATION NUMBER
	LOCATION OF OPERATION
ADDRESS (HOME OR MAIN OFFICE)	OPERATIONS TO BEGIN ON OR ABOUT:

There are on file with the Workers' Compensation Board, documents indicating that the above-named employer has complied with the Disability Benefits Law with respect to all of his or her employees in the following manner:

- By approved self-insurance pursuant to Section 211, subdivision 3 of the Disability Benefits Law.
- By a combination of approved self-insurance pursuant to Section 211, subdivision 3 of the Disability Benefits Law and insurance with authorized insurance carrier(s).

Date:

By: Gina Wagoner  
WC Examiner

DB-155 (3/04)

THIS AGENCY EMPLOYS & SERVES PEOPLE WITH DISABILITIES WITHOUT DISCRIMINATION



# Affidavit of Exemption to Show Specific Proof of Workers' Compensation Insurance Coverage for a 1, 2, 3 or 4 Family, Owner-occupied Residence

*\*\*This form cannot be used to waive the workers' compensation rights or obligations of any party.\*\**

**Under penalty of perjury**, I certify that I am the owner of the 1, 2, 3 or 4 family, **owner-occupied** residence (including condominiums) listed on the building permit that I am applying for, and I am not required to show specific proof of workers' compensation insurance coverage for such residence because (please check the appropriate box):

- I am performing all the work for which the building permit was issued.
- I am not hiring, paying or compensating in any way, the individual(s) that is(are) performing all the work for which the building permit was issued or helping me perform such work.
- I have a homeowners insurance policy that is currently in effect and covers the property listed on the attached building permit AND am hiring or paying individuals a total of less than 40 hours per week (aggregate hours for all paid individuals on the jobsite) for which the building permit was issued.

I also agree to either:

- ◆ acquire appropriate workers' compensation coverage and provide appropriate proof of that coverage on forms approved by the Chair of the NYS Workers' Compensation Board to the government entity issuing the building permit if I need to hire or pay individuals a total of 40 hours or more per week (aggregate hours for all paid individuals on the jobsite) for work indicated on the building permit; or if appropriate, file a CE-200 exemption form; OR
- ◆ have the general contractor, performing the work on the 1, 2, 3 or 4 family, **owner-occupied** residence (including condominiums) listed on the building permit that I am applying for, provide appropriate proof of workers' compensation coverage or proof of exemption from that coverage on forms approved by the Chair of the NYS Workers' Compensation Board to the government entity issuing the building permit if the project takes a total of 40 hours or more per week (aggregate hours for all paid individuals on the jobsite) for work indicated on the building permit.

\_\_\_\_\_  
(Signature of Homeowner)

\_\_\_\_\_  
(Date Signed)

\_\_\_\_\_  
(Homeowner's Name Printed)

Home Telephone Number \_\_\_\_\_

Property Address that requires the building permit:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

<p><i>Sworn to before me this _____ day of _____,</i></p> <p>_____</p> <p><i>(County Clerk or Notary Public)</i></p>
--

Once notarized, this BP-1 form serves as an exemption for both workers' compensation and disability benefits insurance coverage.

LAWS OF NEW YORK, 1998  
CHAPTER 439

The **general municipal law is amended by adding a new section 125** to read as follows:

125. ISSUANCE OF BUILDING PERMITS. NO CITY, TOWN OR VILLAGE SHALL ISSUE A BUILDING PERMIT WITHOUT OBTAINING FROM THE PERMIT APPLICANT EITHER:

1. PROOF DULY SUBSCRIBED THAT WORKERS' COMPENSATION INSURANCE AND DISABILITY BENEFITS COVERAGE ISSUED BY AN INSURANCE CARRIER IN A FORM SATISFACTORY TO THE CHAIR OF THE WORKERS' COMPENSATION BOARD AS PROVIDED FOR IN SECTION FIFTY-SEVEN OF THE WORKERS' COMPENSATION LAW IS EFFECTIVE; OR

2. AN AFFIDAVIT THAT SUCH PERMIT APPLICANT HAS NOT ENGAGED AN EMPLOYER OR ANY EMPLOYEES AS THOSE TERMS ARE DEFINED IN SECTION TWO OF THE WORKERS' COMPENSATION LAW TO PERFORM WORK RELATING TO SUCH BUILDING PERMIT.

## Implementing Section 125 of the General Municipal Law

### 1. General Contractors -- Business Owners and Certain Homeowners

For **businesses and certain homeowners listed as the general contractors on building permits**, proof that they are in compliance with Section 57 of the Workers' Compensation Law (WCL) is **ONE** of the following forms that indicate that they are:

- ◆ insured (C-105.2 or U-26.3),
- ◆ self-insured (SI-12), or
- ◆ are exempt (CE-200),

under the mandatory coverage provisions of the WCL. Any residence that is not a **1, 2, 3 or 4 Family, Owner-occupied Residence** is considered a business (income or potential income property) and must prove compliance by filing one of the above forms.

### 2. Owner-occupied Residences

For homeowners of a **1, 2, 3 or 4 Family, Owner-occupied Residence**, proof of their exemption from the mandatory coverage provisions of the Workers' Compensation Law when applying for a building permit is to file form BP-1.

- ◆ Form BP-1 shall be filed if the homeowner of a **1, 2, 3 or 4 Family, Owner-occupied Residence** is listed as the general contractor on the building permit, and the homeowner:
  - ◇ is performing all the work for which the building permit was issued him/herself,
  - ◇ is not hiring, paying or compensating in any way, the individual(s) that is(are) performing all the work for which the building permit was issued or helping the homeowner perform such work, or
  - ◇ has a homeowner's insurance policy that is currently in effect and covers the property for which the building permit was issued AND the homeowner is hiring or paying individuals a total of less than 40 hours per week (aggregate hours for all paid individuals on the jobsite) for the work for which the building permit was issued.
- ◆ If the homeowner of a **1, 2, 3 or 4 Family, Owner-occupied Residence** is hiring or paying individuals a total of **40 hours or MORE** in any week (aggregate hours for all paid individuals on the jobsite) for the work for which the building permit was issued, then the homeowner may not file the "Affidavit of Exemption" form, BP-1(11/04), but shall either:
  - ◇ acquire appropriate workers' compensation coverage and provide appropriate proof of that coverage on forms approved by the Chair of the NYS Workers' Compensation Board to the government entity issuing the building permit (the C-105.2 or U-26.3 form), OR
  - ◇ have the general contractor, (performing the work on the 1, 2, 3 or 4 family, **owner-occupied** residence (including condominiums) listed on the building permit) provide appropriate proof of workers' compensation coverage, or proof of exemption from that coverage on forms approved by the Chair of the NYS Workers' Compensation Board to the government entity issuing the building permit.

STATE OF NEW YORK - WORKERS' COMPENSATION BOARD  
ESTADO DE NUEVA YORK - JUNTA DE COMPENSACION OBRERA  
NOTICE OF COMPLIANCE  
WORKERS' COMPENSATION LAW

AVISO DE CUMPLIMIENTO  
LEY DE COMPENSACION OBRERA

TO EMPLOYEES

A EMPLEADOS

IMPORTANT INFORMATION FOR EMPLOYEES WHO ARE INJURED OR SUFFER AN OCCUPATIONAL DISEASE WHILE WORKING.

INFORMACION IMPORTANTE PARA EMPLEADOS QUE SEAN LESIONADOS O SUFRAN UNA ENFERMEDAD OCUPACIONAL MIENTRAS TRABAJAN.

1. By posting this notice and information concerning your rights as an injured worker, your compliance with the Workers' Compensation Law.
2. If you do not notify your employer within 30 days of the date of your injury your claim may be disallowed, so do so immediately.
3. You are entitled to obtain any necessary medical treatment and should do so immediately.
4. You may choose any doctor, podiatrist, chiropractor or psychologist referred by a medical doctor that accepts NY State Workers Compensation patients and is Board authorized. However, if your employer is involved in a certified preferred provider organization (PPO) you must first be treated by a provider chosen by your employer and your employer must give you a written statement of your rights concerning further medical care.
5. You should tell your doctor to file copies of medical reports concerning your claim with the Workers' Compensation Board and with your employer's insurance company, which is indicated at the bottom of this form.
6. You may be entitled to lost time benefits if your work-related injury keeps you from work for more than seven days, compels you to work at lower wages or results in permanent disability to any part of your body. You may be entitled to rehabilitation services if you need help returning to work.
7. You should not pay any medical providers directly. They should send their bills to your employers insurance carrier. If there is a dispute, the provider must wait until the Board makes a decision before it attempts to collect payment from you. If you do not pursue your claim or the Board rules that your injury is not work-related, you may be responsible for the payment of the bills.
8. You are entitled to be represented by an attorney or licensed representative, but it is not required. If you do hire a representative do not pay him/her directly. Any fee will be set by the Board and will be deducted from your award.
9. If you have difficulty in obtaining a claim form or need help in filling it out or you have any other questions or problems about a job-related injury, contact any office of the Workers' Compensation Board.

1. Su patrono esta cumpliendo la Ley de Compensacion Obrera cuando despliega este comunicado concerniente a sus derechos como trabajador lesionado.
2. Si usted no notifica a su patrono dentro del termino de 30 dias de haber sufrido su lesion su reclamacion podria ser desestimada, por eso notifique inmediatamente.
3. Usted tiene derecho a recibir cualquier tratamiento medico necesario relacionado con su lesion y debe gestionarlo inmediatamente.
4. Para el tratamiento de cualquier lesion o enfermedad relacionada con el trabajo usted puede escoger cualquier medico, podiatra, quiropractico o psicologo (si es referido por un medico autorizado) que esta autorizado y acepte pacientes de la Junta de Compensacion Obrera. Sin embargo, si su patrono esta autorizado a participar en una organizacion certificada de proveedores preferidos (PPO), usted debera obtener tratamiento inicial de cualquier lesion o enfermedad relacionada con el trabajo de la correspondiente entidad. Patronos que participen en cualquiera de estos programas establecidos por ley estan obligados a proporcionar a sus empleados notificacion escrita explicando sus derechos y obligaciones bajo el programa que este acogido.
5. Usted debera revelar a su Medico que radique copias de los informes medicos de su caso en la Junta de Compensacion Obrera y en la compania de seguros de su patrono, que se indica al final de esta forma.
6. Usted tiene derecho a compensacion si su lesion relacionada con el trabajo le impide trabajar por mas de siete dias, le obliga a trabajar a sueldo mas bajo o resulta en incapacidad permanente de cualquier parte de su cuerpo. Usted puede tener derecho a servicios de rehabilitacion si necesita ayuda para regresar al trabajo.
7. No pague a ningun proveedor medico directamente por tratamiento de su lesion o enfermedad relacionada con el trabajo. Ellos deben enviar sus facturas al asegurador de su patrono. Si el caso es cuestionado, el proveedor debera esperar hasta que la junta decida el caso, antes de iniciar gestion de cobro alguna contra usted. Si usted no tramita su caso o la Junta con el trabajo, usted podria ser responsable del pago de las facturas.
8. No es obligatorio el estar representado en ninguno de los procedimientos de la Junta, pero es un derecho que usted tiene, el estar representado por abogado o por representante licenciado si usted asi lo desea. Si es representado, no pague al abogado o al representante licenciado. Cuando la Junta decida su caso, los honorarios seran determinados por la Junta y descontados de sus beneficios.
9. Si tiene dificultad en conseguir un formulario de reclamacion o necesita ayuda para llenarlo o tiene dudas sobre cualquier situacion relacionada con una lesion o enfermedad comuniquese con la oficina mas cercana de la Junta.

WORKERS' COMPENSATION BOARD OFFICES

Albany, 12241 - 100 Broadway-Menands - (866) 750-5157  
• Brooklyn, 11201 - III Livingston St. - Brooklyn - (800) 877-1373  
Binghamton, 113901 - State Office Bldg. - 44 Hawley St. - (866) 802-3604  
Buffalo, 14202 - Statter Tower, 107 Delaware Ave. - (866) 211-0645  
• Hauppauge, 11788 - 220 Rabro Drive - Suite 100 - (866) 681-5354  
• Hempstead, 11550 - 175 Fulton Avenue - (866) 805-3630  
• New York, 10027 - 215 W. 1125th St., Manhattan - (800)-877-1373  
• Peekskill, 10506 - 41 North Division St. (866) 746-0552  
• Queens, 11432 - 168-46 91st Ave., Jamaica (800) 877-1373  
Rochester, 14614 - 130 Main Street West - (866) 211-0644  
Syracuse, 13203 - 935 James St. - (866) 802-3730

• DOWNSTATE MAIL ADDRESS

Claims-related mail for the Hauppauge, Hempstead, Peekskill and all NYC offices should be mailed to:  
PO Box 5205 Binghamton, NY 13902-5205

ARY S. WEISS CHAIR/PRESIDENT ZACH

Workers' Compensation benefits, when due, will be paid by

( Los beneficios de Compensacion Obrera, cuando debidos, seran pagados por):

SAMPLE

Effective From (En vigor Desde) ----- To -----  
(Hasta Cancellation)

Policy No. (Poliza No) -----

Name of employer (Nombre del patrono)

THIS NOTICE MUST BE POSTED  
CONSPICUOUSLY IN AND ABOUT THE  
EMPLOYER'S PLACE OR PLACES OF  
BUSINESS

C-105(4-09)  
S.I.F. U-30e  
"U30SIF/SN"

PRESCRIBED BY CHAIR  
WORKERS' COMPENSATION BOARD  
STATE OF NEW YORK  
www.wcb.state.ny.us

Failure by an employer to post this notice in and about the employer's place or places of business may result in a \$250 penalty for each violation.

STATE OF NEW YORK  
WORKERS' COMPENSATION BOARD

ESTADO DE NUEVA YORK  
JUNTA DE COMPENSACIÓN OBRERA

NOTICE OF COMPLIANCE  
DISABILITY BENEFITS LAW  
TO EMPLOYEES

AVISO DE CUMPLIMIENTO  
LEY DE BENEFICIOS POR INCAPACIDAD  
A LOS EMPLEADOS

- If you are unable to work because of an illness or injury not work-related, you may be entitled to receive weekly benefits from your employer, or his or her insurance company, or from the Special Fund for Disability Benefits.
- To claim benefits You must file a claim form, within 30 days from the first date of your disability, but in no event more than 26 weeks from such date.
- Use one of the following claim forms:  
-if, when your disability begins you are employed or are unemployed for four weeks or less, use WHITE claim form (Form DB-450), which you may obtain from your employer, his or her insurance carrier, your health provider or any office of the Workers' Compensation Board, and send it to your employer or the insurance carrier named below.  
-If, when your disability begins, you have been unemployed more than four weeks, use the GREEN claim form (Form DB-300), which you may obtain from any Unemployment Insurance Office, your health provider, or any office of the Workers' Compensation Board. Send completed claim form to the Workers' Compensation Board, Disability Benefits Bureau Albany, New York 12241.  
**IMPORTANT** Before filing your claim, your health provider must complete the "Health Care Provider's Statement" on the claim form, showing your period of disability.
- You are entitled to be treated by any physician, chiropractor, dentist, nurse-midwife, podiatrist or psychologist of your choice. However, unlike workers' compensation, your medical bills will not be paid unless your employer and/or union provide for the payment of such bills under a Disability Benefits Plan or Agreement.
- If you are ill or injured during the time you are receiving Unemployment Insurance Benefits, file a claim for Disability Benefits as soon as you sustain the injury or illness, by following the instructions outlined above.
- If you are out of work in excess of seven days, your employer is required to send you a Disability Benefits Statement of Rights (Form DB-271).
- Other information about Disability Benefits may be obtained by writing or calling the nearest Workers' Compensation Board Office.

- Si usted no puede trabajar debido a enfermedad o lesión no relacionada con el trabajo, podría tener derecho a recibir, beneficios semanales de su patrón o de la compañía de seguros de él/ella o del Fondo Especial para Beneficios por Incapacidad.
- Para reclamar beneficios usted debe Presentar una forma de reclamación, dentro de 30 días a Partir de la Primera fecha de su incapacidad, pero en ningún caso más de 26 semanas de dicha fecha.
- Use una de las siguientes formas de reclamación:  
-Si, cuando comience su incapacidad usted está empleado o ha estado desempleado por cuatro semanas o menos, use la forma de reclamación BLANCA (form DB-450), la cual puede obtener de su patrón o de la compañía de seguros de él/ella, o de su proveedor de cuidados de salud, o bien de cualquier oficina de la Junta de Compensación Obrera, y envíela a su patroh o a la compañía de seguros nombrada abajo.  
-Si, cuando comience su incapacidad, usted ha estado desempleado más de cuatro semanas, use la forma de reclamación VERDE (form DB-300), la cual puede obtener en cualquier Oficina de Seguro de Desempleo, de su proveedor de salud, o bien de cualquier oficina de la Junta de Compensación Obrera Envíe la forma de reclamación, debidamente terminada, a Workers' Compensation Board, Disability Benefits Bureau, Albany, New York 12241.  
**IMPORTANTE** Antes de presentar usted su reclamación, es necesario que su proveedor de salud complete la declaración del médico ("Health Care Provider's Statement") en la forma de reclamación, indicando el período de su incapacidad.
- Usted tiene derecho a ser tratado por cualquier medico, quiroprático, dentista enfermera-partera, podiatra o psicologo que usted elija. Pero, contrariamente a la compensación obrera, sus cuentas médicas no serán pagadas a menos que su patrón y/o Unión haga el pago de tales cuentas médicas bajo un Plan o Convenio de Beneficios por Incapacidad.  
Si estuviera usted enfermo o lesionado durante el tiempo que esté recibiendo beneficios del Seguro de Desempleo, presente una reclamación por beneficios por Incapacidad, siguiendo las instrucciones arriba descritas, tan pronto como sufra la lesión o la enfermedad.  
Si usted está desempleado por más de siete días, su patrón está obligado a enviarle la declaración de Derechos de Beneficios por incapacidad (Form DB-271).
- Otras informaciones relativas a Beneficios por incapacidad pueden obtenerse escribiendo o llamando a la oficina mas cercana de la Junta de Compensación Obrera.

WORKERS' COMPENSATION BOARD OFFICES

Albany, 12241 - 100 Broadway-Menands - (518) 474-6681  
 Binghamton, 13901 - State Office Bldg - 44 Hawley St. - (607) 721-8333  
 Buffalo, 14203-State Office Bldg -125 Main St. - (716) 847-3171  
 Hempstead, 11550 -175 Fulton Avenue - (516) 560-7145  
 Rochester, 14614 - 130 Main Street West - (716) 239-8300  
 Syracuse, 13202 - State Office Bldg -333 E. Washington St. - (315) 428-4465

*Robert R. Snashall*

Robert R. Snashall  
Chairman (Presidente)

The undersigned employer is in compliance with the provisions of the Disability Benefits Law (El patrón abajo firmante esta en conformidad con las disposiciones de la ley de Beneficios por Incapacidad).

Disability Benefits, when due, will be paid by ( Los Beneficios por Incapacidad, cuando debidos, serán pagados por):

The benefits provided are (Los beneficios provistos son)

<input type="checkbox"/>	Statutory (Estatutarios)	<input type="checkbox"/>	Under a Plan or Agreement (Bajo un Plan o Convenio)
--------------------------	-----------------------------	--------------------------	--

Class(es) of employees covered (Clasé(s) de empleados amparados)

ALL EMPLOYEES ELIGIBLE UNDER NY DBL

Name of employer (Nombre del Patrón)

SAMPLE

Effective: From ( \_\_\_\_\_ ) To UNTIL CANCELLED  
 (En Vigor Desde) (HASTA)

Policy No \_\_\_\_\_  
 (Poliza No.)

THE WORKERS' COMPENSATION BOARD EMPLOYS AND SERVES  
PEOPLE WITH DISABILITIES WITHOUT DISCRIMINATION.

LA JUNTA DE COMPENSACIÓN OBRERA EMPLEA Y SIRVE  
A PERSONAS INCAPACITADAS SIN DISCRIMINAR.

By *W. J. J.*

**Erie County Water Authority  
ACORD Endorsement Samples**

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY

**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.**

**ADDITIONAL INSURED – OWNERS, LESSEES OR  
CONTRACTORS – (FORM B)**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART.

**SCHEDULE**

**Name of Person or Organization:**

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

WHO IS AN INSURED (Section II) is amended to include as an insured the person or organization shown in the Schedule, but only with respect to liability arising out of "your work" for that insured by or for you.

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY

**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.**

## **ADDITIONAL INSURED – DESIGNATED PERSON OR ORGANIZATION**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART.

**SCHEDULE**

Name of Person or Organization:

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

WHO IS AN INSURED (Section II) is amended to include as an insured the person or organization shown in the Schedule as an insured but only with respect to liability arising out of your operations or premises owned by or rented to you.

SAMPLE ISO FORM

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

## POLLUTION LIABILITY – BROADENED COVERAGE FOR COVERED AUTOS – BUSINESS AUTO, MOTOR CARRIER AND TRUCKERS COVERAGE FORMS

This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM  
MOTOR CARRIER COVERAGE FORM  
TRUCKERS COVERAGE FORM

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by the endorsement.

**A. Liability Coverage** is changed as follows:

1. Paragraph **a.** of the **Pollution Exclusion** applies only to liability assumed under a contract or agreement.
2. Exclusion **B.6. Care, Custody Or Control** does not apply.

**B. Changes In Definitions**

For the purposes of this endorsement, Paragraph **D.** of the **Definitions** Section is replaced by the following:

**D.** "Covered pollution cost or expense" means any cost or expense arising out of:

1. Any request, demand, order or statutory or regulatory requirement; or
2. Any claim or "suit" by or on behalf of a governmental authority demanding

that the "insured" or others test for, monitor, clean up, remove, contain, treat, detoxify or neutralize, or in any way respond to, or assess the effects of "pollutants".

"Covered pollution cost or expense" does not include any cost or expense arising out of the actual, alleged or threatened discharge, dispersal, seepage, migration, release or escape of "pollutants".

- a. Before the "pollutants" or any property in which the "pollutants" are contained are moved from the place where they are accepted by the "insured" for movement into or onto the covered "auto"; or

- b. After the "pollutants" or any property in which the "pollutants" are contained are moved from the covered "auto" to the place where they are finally delivered, disposed of or abandoned by the "insured".

Paragraphs **a.** and **b.** above do not apply to "accidents" that occur away from premises owned by or rented to an "insured" with respect to "pollutants" not in or upon a covered "auto" if:

- (1) The "pollutants" or any property in which the "pollutants" are contained are upset, overturned or damaged as a result of the maintenance or use of a covered "auto"; and
- (2) The discharge, dispersal, seepage, migration, release or escape of the "pollutants" is caused directly by such upset, overturn or damage.



ENDORSEMENT FOR  
MOTOR CARRIER POLICIES OF INSURANCE FOR PUBLIC LIABILITY  
UNDER SECTIONS 29 and 30 OF THE MOTOR CARRIER ACT OF 1980

Issued to

of

Dated at

This \_\_\_\_\_ day of \_\_\_\_\_

Amending Policy No. \_\_\_\_\_ Effective Date \_\_\_\_\_

Telephone Number \_\_\_\_\_ Countersigned by \_\_\_\_\_  
Authorized Company Representative

Name of Insurance Company \_\_\_\_\_

The policy to which this endorsement is attached provides primary or excess insurance, as indicated by

"", for the limits shown:

This insurance is primary and the company shall not be liable for amounts in excess of  
\$ \_\_\_\_\_ for each accident.

This insurance is excess and the company shall not be liable for amounts in excess of  
\$ \_\_\_\_\_ for each accident in excess of the underlying limit of \$ \_\_\_\_\_  
for each accident.

Whenever required by the Federal Motor Carrier Safety Administration (FMCSA), the company agrees to furnish the FMCSA a duplicate of said policy and all its endorsements. The company also agrees, upon telephone request by an authorized representative of the FMCSA, to verify that the policy is in force as of a particular date. The telephone number to call is:

Cancellation of this endorsement may be effected by the company or the insured by giving (1) thirty-five (35) days notice in writing to the other party (said 35 days notice to commence from the date the notice is mailed; proof of mailing shall be sufficient proof of notice), and (2) if the insured is subject to the FMCSA's registration requirements under 49 U.S.C. 13901, by providing thirty (30) days notice to the FMCSA (said 30 days notice to commence from the date the notice is received by the FMCSA at its office in Washington, D.C.).

**DEFINITIONS AS USED IN THIS ENDORSEMENT**

**ACCIDENT** includes continuous or repeated exposure to conditions which results in bodily injury, property damage, or environmental damage which the insured neither expected nor intended.

**MOTOR VEHICLE** means a land vehicle, machine, truck, tractor, trailer, or semitrailer propelled or drawn by mechanical power and used on a highway for transporting property, or any combination thereof.

**BODILY INJURY** means injury to the body, sickness, or disease to any person, including death resulting from any of these.

**PROPERTY DAMAGE** means damage to or loss of use of tangible property.

**ENVIRONMENTAL RESTORATION** means restitution for the loss, damage, or destruction of natural resources arising out of the accidental discharge, dispersal, release or escape into or upon the land, atmosphere, watercourse, or body of water, of any commodity transported by a motor carrier. This shall include the cost of removal and the cost of necessary measures taken to minimize or mitigate damage to human health, the natural environment, fish, shellfish, and wildlife.

**PUBLIC LIABILITY** means liability for bodily injury, property damage, and environmental restoration.

**ENDORSEMENT FOR  
MOTOR CARRIER POLICIES OF INSURANCE FOR PUBLIC LIABILITY  
UNDER SECTIONS 29 and 30 OF THE MOTOR CARRIER ACT OF 1980**

The insurance policy to which this endorsement is attached provides automobile liability insurance and is amended to assure compliance by the insured, within the limits stated herein, as a motor carrier of property, with Sections 29 and 30 of the Motor Carrier Act of 1980 and the rules and regulations of the Federal Motor Carrier Safety Administration (FMCSA).

In consideration of the premium stated in the policy to which this endorsement is attached, the insurer (the company) agrees to pay, within the limits of liability described herein, any final judgment recovered against the insured for public liability resulting from negligence in the operation, maintenance or use of motor vehicles subject to the financial responsibility requirements of Sections 29 and 30 of the Motor Carrier Act of 1980 regardless of whether or not each motor vehicle is specifically described in the policy and whether or not such negligence occurs on any route or in any territory authorized to be served by the insured or elsewhere. Such insurance as is afforded, for public liability, does not apply to injury to or death of the insured's employees while engaged in the course of their employment, or property transported by the insured, designated as cargo.

It is understood and agreed that no condition, provision, stipulation, or limitation contained in the policy, this endorsement, or any other endorsement thereon, or violation thereof, shall relieve the company from liability or from the payment of any final judgment, within the limits of liability herein described, irrespective of the financial condition, insolvency or bankruptcy of the insured. However, all terms, conditions, and limitations in the policy to which the endorsement is attached shall remain in full force and effect as binding between the insured and the company. The insured agrees to reimburse the company for any payment made by the company on account of any accident, claim, or suit involving a breach of the terms of the policy, and for any payment that the company would not have been obligated to make under the provisions of the policy except for the agreement contained in this endorsement.

It is further understood and agreed that, upon failure of the company to pay any final judgment recovered against the insured as provided herein, the judgment creditor may maintain an action in any court of competent jurisdiction against the company to compel such payment.

The limits of the company's liability for the amounts prescribed in this endorsement apply separately, to each accident, and any payment under the policy because of any one accident shall not operate to reduce the liability of the company for the payment of final judgments resulting from any other accident.

**THE SCHEDULE OF LIMITS SHOWN ON THE NEXT PAGE DOES NOT PROVIDE COVERAGE.**

The limits shown in the schedule are for information purposes only.

**ENDORSEMENT FOR  
MOTOR CARRIER POLICIES OF INSURANCE FOR PUBLIC LIABILITY  
UNDER SECTIONS 29 and 30 OF THE MOTOR CARRIER ACT OF 1980**

**SCHEDULE OF LIMITS  
Public Liability**

	Type of Carriage	Commodity Transported	Minimum Insurance
(1)	For-hire (In interstate or foreign commerce).	Property (nonhazardous).	\$ 750,000
(2)	For-hire and Private (In interstate, foreign, or intrastate commerce, with a gross vehicle weight rating of 10,000 or more pounds).	Hazardous substances, as defined in 49 CFR 171.8, transported in cargo tanks, portable tanks, or hopper-type vehicles with capacities in excess of 3,500 water gallons; or in bulk Division 1.1, 1.2, and 1.3 materials; any quantity of Division 2.3, Hazard Zone A, or Division 6.1, Packing Group I, Hazard Zone A material; in bulk Division 2.1 or 2.2; or highway route controlled quantities of a Class 7 material as defined in 49 CFR 173.403.	5,000,000
(3)	For-hire and Private (In interstate or foreign commerce, in any quantity; or in intrastate commerce, in bulk only; with a gross vehicle weight rating of 10,000 or more pounds).	Oil listed in 49 CFR 172.101; hazardous materials and hazardous substances defined in 49 CFR 171.8 and listed in 49 CFR 172.101, but not mentioned in (2) above or (4) below.	1,000,000
(4)	For-hire and Private (In interstate or foreign commerce, with a gross vehicle weight rating of less than 10,000 pounds).	Any quantity of Division 1.1, 1.2, or 1.3 material; any quantity of a Division 2.3, Hazard Zone A, or Division 6.1, Packing Group I, Hazard Zone A material; or highway route controlled quantities of a Class 7 material as defined in 49 CFR 173.403.	5,000,000

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**APPENDIX C**

**PREVAILING WAGE RATE SCHEDULE**

**ERIE COUNTY WATER AUTHORITY**



**INSTRUCTIONS AND SCHEDULE OF MINIMUM WAGE RATES ISSUED BY  
NEW YORK STATE LABOR DEPARTMENT**

PROJECT: Contract OBG-12A - Sturgeon Point and Van De Water Improvements Project

NYS DOL PRC#: 2016005291

No laborer, worker or mechanic in the employ of the CONTRACTOR or a Subcontractor or other person doing or contracting to do a whole or a part of the work contemplated by this agreement, shall be permitted or required to work more than eight (8) hours in any calendar day, or more than five (5) days in any one week, except in cases of extraordinary emergency caused by fire, flood, or damages to life and property.

The wages to be paid for a legal day's work to laborers, workmen or mechanics under this agreement, shall not be less than the prevailing rate of wages as defined and determined by the Industrial Commissioner of the State of New York, a schedule of which is attached to this contract and made a part thereof, with the same force and effect as though set forth in full herein.

In the performance of the work the CONTRACTOR shall give preference to citizens of the State of New York who have been residents for at least twelve (12) months immediately prior to the commencement of their employment, and persons other than citizens may be employed when citizens of the State of New York are not available. If the above provisions of this contract and the provisions of Sec. 222 of the Law of the State of New York are not complied with, this contract Labor shall be void.

In the hiring of employees for the performance of work under this contract or by subcontract hereunder, the CONTRACTOR or subcontractor, or any persons acting on behalf of the CONTRACTOR or subcontractor, shall not by any reason of race or color discriminate against or intimidate any employee hired for the performance of work under this contract on account of race or color.

There may be deducted from the amount payable to the CONTRACTOR by the Water Authority, under this contract, a penalty of five dollars (\$5.00) for each person for each calendar day during which such person was discriminated against or intimidated in violation of the provisions of this contract.

This contract may be cancelled or terminated by the Water Authority and all monies due or to become due hereunder may be forfeited for a second or subsequent violation of the terms or conditions of the preceding paragraph of this contract.

**PUBLIC WORKS - FAILURE TO PAY PREVAILING WAGE  
EXCLUSION FROM CONTRACTING OR SUBCONTRACTING**

**CHAPTER 147**

A. 7314-A

Memorandum relating to this chapter, see Legislative Memoranda, post.

Approved may 24, 1991, effective as provided in Section 3.

An act to amend the labor law, in relation to debarment of public building service CONTRACTORS

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1:

Paragraph b of Subdivision 3 of Section 220-b of the Labor Law, as amended by Chapter 651 of the Laws of 1989, is amended to read as follows:

- b. When two final determinations have been rendered against a CONTRACTOR or subcontractor and/or its successor within any consecutive six-year period determining that such CONTRACTOR or subcontractor and/or its successor has willfully failed to pay the prevailing rate of wages or to provide supplements in accordance with this article, whether such failures were concurrent or consecutive and whether or not such final determinations concerning separate public work projects are rendered simultaneously, such CONTRACTOR or subcontractor and/or its successor shall be ineligible to submit a bid on or be awarded any public work contract with the state, any municipal corporation or public body for a period of five years from the second final determination. For purposes of this article, a successor shall mean an employer engaged in work substantially similar to that of the predecessor, where there is substantial continuity of operation with that of the predecessor.



SECTION 2:

Subdivision 7 of Section 235 of the labor Law, as added by Chapter 777 of the Laws of 1971, is amended to read as follows:

7. When, pursuant to the provisions of this section two final orders have been entered against a CONTRACTOR or subcontractor and/or its successor within any consecutive six-year period determining that such CONTRACTOR or subcontractor and/or its successor has willfully failed to pay the prevailing wages in accordance with the provisions of this article, whether such failures were concurrent or consecutive and whether or not such final determinations concerning separate public building service contracts are rendered simultaneously, such CONTRACTOR or subcontractor and/or its successor, and if the CONTRACTOR or subcontractor and/or its successor is a corporation, any officer of such corporation who knowingly participated in such failure, shall be ineligible to submit a bid on or be awarded any public building service work for a period of five years from the date of the second order. For purposes of this article, a successor shall mean an employer engaged in work substantially similar to that of the predecessor, where there is substantial continuity of operation with that of the predecessor. Nothing of this subdivision shall be construed as affecting any provision of any other law or regulation relating to the awarding of public contracts.

SECTION 3:

This act shall take effect 60 days after the date upon which it shall have become a law and shall apply to any conduct occurring after such date.

STATE OF NEW YORK  
DEPARTMENT OF LABOR

NOTICE TO ALL PUBLIC OFFICIALS IN CHARGE OF  
PUBLIC WORK CONSTRUCTION AND ALL CONTRACTORS  
AND SUBCONTRACTORS ENGAGED IN PUBLIC WORKS  
CONSTRUCTION IN THE STATE OF NEW YORK

Article 8, Section 220 of the Labor Law, as amended by Chapter 750 of the Laws of 1956, provides, among other things, that it shall be the duty of the fiscal officer to make a determination of the schedule of wages to be paid to all laborers, workmen and mechanics employed on public work projects including supplements for welfare, pension, vacation and other benefits. These supplements may include hospital, surgical or medical insurance or benefits; life insurance or death benefits; accidental death or dismemberment insurance; and pension or retirement benefits. If the amount of supplements provided by the employer is less than the total supplements shown on the wage schedule, the difference shall be paid in cash to employees.

Article 8, Section 220 of the Labor Law, as amended by Chapter 750 of the Laws of 1956, also provides that the supplements to be provided to laborers, workmen and mechanics upon public works "shall be in accordance with the prevailing practices in the locality..." The amount for supplements listed on the enclosed schedule does not necessarily include all types of prevailing supplements in the locality, and a future determination of the Industrial Commissioner may require the CONTRACTOR to provide additional supplements.

The CONTRACTOR shall provide statutory benefits for disability benefits, workmen's compensation, unemployment insurance and Social Security.

The substance of this notice should be included in your contract.

Signed - Dr. Philip Ross  
INDUSTRIAL COMMISSIONER

PW-39 (5-56)

Article 8 of the New York State Labor Law was amended on July 15, 1983 to provide that wages for Public Projects are to be paid pursuant to the existing Bargaining Agreement in the area where the work is to be performed.

Wages are to be paid on this project as hereinafter set forth or pursuant to the Collective Bargaining Agreement in effect in Erie County, whichever are higher.

During the performance of this contract, the CONTRACTOR agrees as follows:

- (a) The CONTRACTOR will not discriminate against any employee or applicant for employment because of race, creed, sex, age, color or national origin, and will take affirmative action to insure that they are afforded equal employment opportunities without discrimination because of race, creed, sex, age, color or national origin or because a person has opposed any practices forbidden under these sections or because he filed a complaint, testified, or assisted in any proceeding under these sections. Such action shall be taken with reference, but not limited to: recruitment, employment, classification, job assignment, promotion, upgrading, demotion, transfer, layoff, discharge, expulsion or termination, rates of pay or other forms of compensation, and selection for training or retraining, including apprenticeship and on-the-job training.
- (b) The 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 (a) through (h) (hereinafter called "non-discrimination clauses) and requesting such labor union or representative to agree in writing, whether in such collective bargaining or other agreement or understanding or otherwise, that such labor union or representative will not discriminate against any member or applicant for membership because of race, creed, sex, age, color or national origin, and will take affirmative action to insure that they are afforded equal membership opportunities without discrimination because of race, creed, sex, age, color or national origin. Such action shall be taken with reference, but not limited to: recruitment, employment, job assignment, promotion, upgrading, classification, demotion, transfer, layoff, discharge, expulsion or termination, rates of pay or other forms of compensation, and selection for training or retraining, including apprenticeship and on-the-job training. Such notice shall be given by the CONTRACTOR prior to the commencement of performance of this contract. Such written agreement shall be made by such labor union or representative prior to the commencement of performance of this contract, unless such labor union or representative fails or refuses so to agree in writing, in which event the CONTRACTOR shall promptly notify the State Commission for Human Rights of such failure or refusal.
- (c) The CONTRACTOR will post and keep posted in conspicuous places, available to employee's and applicants for employment, notices to be provided by the State Commission for Human Rights setting forth the substance of the provisions of clauses (a) and (b) and such provisions of the State's laws against discrimination as the State Commission for Human Rights shall determine.

- (d) The CONTRACTOR will state, in all solicitations or advertisements for employees placed by or on behalf of the CONTRACTOR, that all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, sex, age, color or national origin.
- (e) The CONTRACTOR will comply with the provisions of Sections 291-299 of the Executive Law and the Civil Rights Law, 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 and the Industrial Commissioner for purposes of investigation to ascertain compliance with these non-discrimination clauses and such sections of the Executive Law and Civil Rights Law.
- (f) This contract may be forthwith cancelled, terminated or suspended, in whole or in part, by the contracting agency upon the basis of a finding made by the State Commission for Human Rights that the CONTRACTOR has not complied with these non-discrimination clauses, and the 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, until he satisfied the State Commission for Human Rights that he has established and is carrying out a program in conformity with the provisions of these non-discrimination clauses. Such finding shall be made by 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 the 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.
- (g) If this contract is cancelled or terminated under clause (f), in addition to other rights of the Erie County Water Authority provided in this contract upon its breach by the CONTRACTOR, the CONTRACTOR will hold the Erie County Water Authority harmless against any additional expenses or costs incurred by the Authority in completing the work or in purchasing the services, materials, equipment or supplies contemplated by this contract, and the Erie County Water Authority may withhold payments from the CONTRACTOR in an amount sufficient for this purpose and recourse may be had against the surety on the performance bond if necessary.
- (h) The CONTRACTOR will include the provisions of clauses (a) through (g) in every subcontract or purchase order in such manner that provisions will be binding upon each subcontractor or vendor as to operations to be performed within the State of New York. The CONTRACTOR will take such action in enforcing such provisions of such subcontract or purchase order as the contracting agency may direct, including sanctions or remedies for noncompliance. If the CONTRACTOR becomes involved in or is threatened with litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the CONTRACTOR shall promptly so notify the Attorney General and Attorney for the Erie County Water Authority, requesting them to intervene and protect the interest of the State of New York and the Erie County Water Authority.



## Erie County Water Authority

295 Main Street, Rm. 350 • Buffalo, NY 14203-2494  
716-849-8484 • Fax 716-849-8467

January 12, 2017

H&K Services  
12025 Leon Road  
Leon, NY 14751

Re: Contract No. OBG-12A  
Sturgeon Point and Van de Water  
Improvements  
Project No. 201500169  
Contract No. 17-01-01

Greetings:

Enclosed herewith please find an executed contract with the Erie County Water Authority for the above-referenced project in the contract award price of \$2,957,800.00.

Receipt of this contract constitutes your authority to commence work on this project. Please contact Len Kowalski, Sr. Distribution Engineer two working days prior to commencement.

On all future invoices, kindly refer to the contract number listed above which is reflected on the first page of the contract document.

Sincerely,

ERIE COUNTY WATER AUTHORITY

Jacqueline Mattina  
Deputy Associate Attorney

JM:tf

Enclosure

cc: Russ Stoll  
Len Kowalski  
Gary Murray  
Trish Fabozzi  
Shari Zajdel  
Michelle McEntire, O'Brien & Gere Engineers



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

**Contract:** OBG-12A **Project No.:** 201500169  
**Project Description:** Sturgeon Point and Van de Water Improvements Project

**Item Description:**

Agreement   
  Professional Service Contract   
  Amendment   
  Change Order  
 BCD   
  NYSDOT Agreement   
  Contract Documents   
  Addendum  
 Recommendation for Award of Contract   
  Recommendation to Reject Bids  
 Request for Proposals  
 Other \_\_\_\_\_

**Action Requested:**

Board Authorization to Execute   
  Legal Approval  
 Board Authorization to Award   
  Execution by the Chairman  
 Board Authorization to Advertise for Bids   
  Execution by the Secretary to the Authority  
 Board Authorization to Solicit Request for Proposals  
 Other \_\_\_\_\_

**Approvals Needed:**

**APPROVED AS TO CONTENT:**

Department Head *Jeanne F. Keachler* Date: 1/4/17  
 Risk Manager *[Signature]* Date: 01/06/2017  
 Director of Administration \_\_\_\_\_ Date: \_\_\_\_\_  
 Executive Engineer *Russell Stiles* Date: 1/4/17

**APPROVED AS TO FORM:**

Legal *[Signature]* Date: 1/6/17

**APPROVED FOR BOARD RESOLUTION:**

Secretary to the Authority \_\_\_\_\_ Date: \_\_\_\_\_

**Remarks:** \_\_\_\_\_

**Resolution Date:** \_\_\_\_\_ **Item No:** \_\_\_\_\_



**ERIE COUNTY WATER AUTHORITY**  
**INTEROFFICE MEMORANDUM**

January 4, 2017

To: Joseph T. Burns, Secretary to the Authority

From: Leonard F. Kowalski, Senior Distribution Engineer *LAK*

Subject: Contract OBG-012-A  
Sturgeon Point and Van de Water Improvements Project  
ECWA Project No. 201500169

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We are transmitting four Project Manuals along with a request for execution of the contract by the Chairman for the above referenced project.

The contract, previously awarded by ECWA to H&K Services, Inc. in the amount of \$2,957,800.00, has been subsequently executed by the contractor. Included in the documents are H&K Services' Performance Bond and Payment Bond.

Following execution by the Chairman, one copy of the document is forwarded to the contractor along with a Notice to Proceed letter, one copy is forwarded to our consultant (O'Brien & Gere Engineers), one copy is forwarded to my attention, and a copy retained in Central Files.

2-A-1501-186-B

2-A\Memo05 Execution.docx